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ABSTRACTS

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U.S. DEPARTMENT OF THE INTERIOR
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0.4 SUBSTANCES OF BIOMEDICAL IMPORTANCE FROM MARINE ORGANISMS

Nigrelli, Ross F., Martin F. Stempien, Jr., George D. Ruggieri, Vincent R. Liguori, and Jack T. Cecil (Osborn Laboratories of Marine Sciences, New York Aquarium, New York Zoological Society, Brooklyn, New York)
Federation Proceedings 26, No. 4, 1197-1205 (July-August 1967)

Most of our present knowledge of biochemistry and pharmacology has come from studies of land animals. Since the majority of the 32 animal phyla are marine, the need for more intensive investigation of marine plants and animals is evident. A knowledge of the substances that can be isolated from these organisms is valuable not only for itself but for the information it provides about the pharmacological activity of classes of compounds.

Many marine organisms have known biomedical qualities--demulcent, cathartic, coagulant and anticoagulant, and emollient, to name a few. Certain extracts from mollusks and steroid glycosides from echinoderms have proven antitumoral capabilities. Toxins from a wide variety of plant and animal life exhibit a neurotropic function that causes muscular contractions, destroys neuromuscular synapses, stimulates respiration, excites sympathetic ganglia, and lyses red cells. Even more organisms have characteristics that may prove useful as starting materials for the commercial production of drugs. For example, octopi secrete a paralytic agent that acts very much like the curares; an extract from sea stars is quite similar to ox insulin; Bonellia viridis, a marine worm, secretes a sex-determining substance; and mollusk isolates yield serotonin (5-hydroxytryptamine, or enteramine). [111 references]

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 ABSTRACTER: L. Baldwin

1.01111 FROZEN FISH INDUSTRY IN NEWFOUNDLAND

(*)

Anonymous
Frozen Foods 20, No. 2, 57 (February 1967) (John Adam House, John Adam Street, London, W.C.2, England)

The production of frozen groundfish in Newfoundland has risen every year since 1962, when production was about 73 million pounds. In 1966, production was about 119 million pounds, which was an increase of more than 11 percent over the previous year's production of about 106 million pounds.

The reasons given for the increased production of frozen fish include a greater supply of fresh fish from an expanded offshore fishing fleet and expansion of processing facilities in existing plants. An increase in production of turbot made a significant contribution to increased production. Cod products comprised about 51 percent by weight of the frozen production, followed by flounder at about 22 percent of total production. Currently, there are 35 freezing plants operating in Newfoundland. These plants utilized about 52 percent of the cod landings in 1966. New plants are presently under construction, as are new vessels for the trawler fleet.

Production of frozen turbot showed the greatest increase in 1966 and exceeded the amount produced in 1965 by about 92 percent. The European market absorbed much of the increased turbot production, although the United States is still

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*Item on back of card.

 ABSTRACTER: E. R. Weissman

0.5 ISOLATION AND GROWTH OF PSYCHROPHILIC BACTERIOPHAGE

Olsen, Ronald H. (Department of Microbiology, University of Michigan, Ann Arbor)
Applied Microbiology 15, No. 1, 198 (January 1967)

Pseudomonas species that produce fluorescent pigments are commonly isolated from the soil. These isolates often prove to be psychrophilic and grow at 0° C. Reports of phage attacking pseudomonads of this type have not indicated the growth-temperature range of the phage. The present study was to determine whether sewage enrichment could be used to obtain phage whose growth temperature was the same as the 0° to 32° C. range commonly observed for psychrophilic bacteria.

A primary settling basin provided the sewage effluent, which was then clarified by low-speed centrifugation. The supernatant was added to a logarithmically growing culture of the psychrophile Pseudomonas geniculata, incubated 48 hr. at 23° C., and then freed of residual bacteria. The phage suspension was diluted in broth for subsequent single plaque isolations.

A phage was isolated and designated PX14. This phage formed clear plaques 4 to 6 mm. in diameter and was capable of utilizing P. geniculata, P. fluorescens A.3.12; and the mesophile P. aeruginosa 2 as hosts. Because the first two pseudomonads do not grow above 32° C., the maximum growth temperature of the phage was determined by plating on P. aeruginosa 2. Plates seeded with P. aeruginosa and incubated at 35° C. did not produce plaques. Plates incubated at 33° and 34° C.

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 ABSTRACTER: E. R. Weissman

1.0112 DOMESTIC AND FOREIGN GROUNDFISH OPERATIONS IN THE NORTHEAST PACIFIC

Ketchen, Keith (Nanaimo Biological Station, Fisheries Research Board of Canada Nanaimo, British Columbia)
Western Fisheries 74, No. 2, 76, 78-80, 82, 84-87, 89 (May 1967)

The two major Canadian fisheries for groundfish are the hook and line fishery, which accounts for all landings of halibut in British Columbia and for some of the landings of blackcod, lingcod, and assorted rockfish; and the trawlnet fishery, which captures several species of flounders, Pacific (gray) cod, lingcod, rockfish, and a few other species. During the past 20 years, these two fisheries have substantially expanded. The total production of food fish in these fisheries was 85 million pounds in 1966, more than double the 1945 production of 35 million pounds. The expanded trawl fishery for Pacific cod has accounted for a large portion of the increase. The catch of halibut has also significantly improved.

When the United States' catch of groundfish in the Northeastern Pacific is added to that of Canada, the total production in 1965 was a record 230 million pounds, which was 30 percent more than in 1945. This production, however, was but a fraction of the total production of groundfish in the area. The big producers in the Northeastern Pacific groundfish fishery were Japan and Russia. Japan began fishing in the area in 1954 and Russia in 1959. By 1961 the total

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 ABSTRACTER: E. R. Weissman

BIOMEDICAL POTENTIAL OF MARINE ORGANISMS

GROWTH OF PSYCHROPHILIC BACTERIOPHAGE

NEWFOUNDLAND FROZEN FISH INDUSTRY

NORTHEAST PACIFIC GROUNDFISH PRODUCTION

0.5

produced minute plates; at these temperatures, the efficiency of plating was quite variable. Therefore, it was concluded that the maximal growth temperature of PX14 corresponded to that commonly observed for many psychrophilic bacteria.

P. geniculata was used as the host for one-step growth curves run in broth at 25° and at 3.5° C. At the higher temperature, phage was adsorbed 10 min. at a multiplicity of 0.1 with 2×10^8 bacteria per milliliter. Dilution stopped adsorption, and unadsorbed phage was determined by filtration. A 15-min. rise period followed a 30-min. latent period. After this time, the burst size was of the range 100 to 150 regardless of whether the host bacteria had been grown at 25° or at 3.5° C. prior to infection. When the cells were infected at 3.5° C., a rise period of 3 hr. followed a latent period of 6 hr. In this case, the burst size was a function of the temperature at which the cells were previously grown. Bacteria grown at 25° C. had a burst size of from 10 to 40 when infected at 3.5° C. Bacteria grown at 3.5° C. and infected at the same temperature had a burst size of from 300 to 350.

The maximal plaque size of PX14 increased slightly as incubation temperature was lowered from 32° C. When nonpsychrophilic phages were plated on the same bacterial indicators, the plaque size decreased as the incubation temperature was lowered from 32° to 20° C.

1.0112

production of these two nations in the Bering Sea reached about 2,000 million pounds. In 1965, their production in the whole North Pacific was 2,834 million pounds. The total production in 1965 for all four countries was 3,070 million pounds.

The Soviet fleet consists of vessels ranging from 2,470 gross tons to 260 gross tons. During the peak of the fishing in 1965, more than 150 Soviet vessels were counted in the area from Unimak Pass to Dixon Entrance. In comparison, there were 79 Canadian trawlers with an average size of 52 gross tons in operation during 1966.

The major Soviet and Japanese effort is aimed at deepwater fishing, and although this effort does not put direct pressure on the Canadian fleet, it may force United States fishermen into stiffer competition with Canadian fishermen for fish on the Continental Shelf. Thus, the Canadian fishing fleet faces competition on its fishing grounds on the Continental Shelf and has the alternatives of (1) diversifying and exploiting fish not likely to be used by other nations or (2) expanding into deepwater fishing in competition with the other nations fishing there.

The author believes that some sort of international fishing agreement should be worked out for the Northeastern Pacific area and that the best prospects for continued growth of the Canadian fishery lie in attention to quality and variety of production, rather than sheer volume.

0.4

Potentially useful substances from the marine environment

Substance	Biomedical activity
	Antiviral
Sulfated polysaccharides from agar	Stunts encephalomyocarditis virus, picornavirus, arborvirus, myxovirus, and herpes virus
Carbohydrate-protein fraction from kelp meal	Inhibits viral neuraminidases and some influenza viruses
D-Arabinosyl nucleosides from sponges	Checks Herpes simplex keratitis and leukemias
Paolin 2 from mollusks	Stunts adenovirus Type 12; and H. simplex keratitis, poliomyelitis, influenza, and polyoma viruses
	Antibiotic
Paolin 1 from mollusks	Stunts hemolytic Streptococcus pyogenes and penicillin-resistant Staphylococcus aureus
Carbohydrate-protein fraction from kelp meal	Inhibits bacterial neuraminidases
Toxins from bacteria, algae, molds, and invertebrates in sea water	Poisons coliform bacteria
Fatty acids, terpene and chlorophyll derivatives, brominated phenolic compounds, sulfated polysaccharides, and acrylic acid from algae	Curbs pathogenic bacteria, yeasts, and Aspergillus fumigatus
Chemically undetermined	Contravenes staphylococci, pseudomonas, acid-fast bacteria, and pathogenic yeasts (e.g., Monilia)

1.01111

the largest market for Newfoundland frozen fish products. As a result of the strong market for frozen fish products, the price of fresh fish reached a record high in Newfoundland. By the end of the season, several freezing plants were paying 5 cents per pound for gutted, head-on cod; the average price of turbot was 3 cents a pound. Fishermen responded by landing a record 28.7 million pounds, 96 percent of which was purchased by the frozen fish plants.

Compulsory registration of filleting and freezing plants producing for export was continued. The quality of the record 1966 production of fresh and frozen fish was considered satisfactory. In order to maintain adequate plant and operating conditions and good-quality production, qualified fishery officers of the Inspection Branch were stationed at filleting and freezing plants on a continuing basis.

In addition to the expansion of the fishing fleet and freezing plants planned for 1967, an attempt is being made through the Atlantic Development Board to increase supplies of approved water for filleting and freezing plants. Engineering and bacteriological surveys were completed for most of the plants producing for export. A second holding depot of about 100,000-pound frozen storage capacity is planned for the Labrador coast, and a site has already been acquired.

(Abstract of this article appears under 9.17 page 19 - May 1967)

Larkin, Peter A.
Western Fisheries 70, 66-67, 82, 83, 86-87 (May 1965)

1.011 NORTH AMERICAN FISHERY POTENTIAL?

1.017 DEVELOPING AUSTRALIA'S FISHERIES

Kesteven, G. L., (CSIRO Division of Fisheries and Oceanography, Australia), and T. W. Burdon (Fisheries Branch, Department of Primary Industry, Canberra, Australia)
Australian Fisheries Newsletter 26, No. 1, 3, 5, 7, 9 (January 1967)

Because of Australia's geographic position and because of the strong demand for fish in Australia, the low level of Australian fish production is an apparent enigma. In 1915, more than 52 million lb. of fish was landed in Australia; in 1964-65, landings had risen by 63.5 percent, to more than 85 million lb. However, the population during the same period rose from about 5,000,000 to over 11,250,000, an increase of 127.8 percent. Thus, the population increased twice as fast as the local production of fish did, which has risen by less than an average 1.3 percent per year over the past 50 years.

It would appear that the scale-fish sector of the fishing industry has lagged behind the general development of the Australian fishing industry as a whole, and that the economy of this sector is virtually stagnant. However, landings of scale fish, not including those of shellfish, for the period from 1905 to 1966 shows that an increase in landings did occur, but it occurred in three main phases rather than as a steady rise. The first phase included World War I; part of the increase for this period is undoubtedly due to improved collection of statistics. The real increase in landings from 1905 to 1915 would seem to be due to improved

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 ABSTRACTER: M. F. Tripple

1.85 (*) PLAN COMMERCIAL SHRIMP FARMING IN MEXICAN COASTAL WATERS

Anonymous
Quick Frozen Foods 39, No. 12, 119-122 (July 1967)

Shrimp consumption in the United States has increased 80 percent since 1951. During the same period, the population increased only 28 percent. Over those 15 years, the quantity of shrimp imported has risen from 24 percent to 57 percent. On a poundage basis, shrimp accounts for one-third of all the frozen seafood sales in the United States; on a dollar basis, it accounts for nearly one-half. In 1951, 18 countries imported shrimp into the United States; now 60 countries do. Of these, Mexico ranks second to none.

Following a 2-week international congress on shrimp and prawns held in Mexico City in June (immediately after the Shrimp Association of the Americas and the International Shrimp Council had held their joint convention in Mexico City), Mexican businessmen and Japanese scientists announced an agreement to begin commercial shrimp growing in Mexico's coastal waters. These farms will supplement the increased production of shrimp at estuaries and in bodies of water connected with the sea; the deep-sea fisheries will be expanded by construction of 50 large shrimp boats that will cost about $2,800,000. Mexico already devotes 12,000 vessels, about 56 percent of her fishing fleet, to the shrimp industry.

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 ABSTRACTER: L. Baldwin

1.51 (*) THE TRAWL FISHERY FOR PACIFIC COD

Ketchen, Keith (Nanaimo Biological Station, British Columbia)
Western Fisheries 73, No. 6, 36-40, 42, 44-45, 56-62 (March 1967)

The trawl fishery for groundfish in British Columbia has undergone a rapid expansion since 1964. The production of foodfish in 1966 reached a record of nearly 50 million pounds, which is more than double the average for the decade ending in 1963. The focal point of the expansion is the Pacific cod or gray cod, which in recent years has accounted for over 50 percent of the groundfish production. The Canadian catch of Pacific cod in 1966 was about 28 million lb.; the total catch for both the United States and Canada probably exceeded 36 million lb.

Over 70 percent of the landings of Pacific cod come from Hecate Strait. Abundance is measured by the average catch per hour, and abundance in Hecate Strait is higher than anywhere else along the Canadian coast; however, it is also more variable. Annual variations in fishing success on all the offshore fishing grounds appear to be dependent on fluctuating annual recruitment. Some cod broods, or year classes, are much stronger than are others, and this strength is reflected in the average sizes of fish that constitute the annual landings. During the past 10 years there have been natural trends in abundance that have had pronounced effects on production. During a period of relatively low abundance that centered around 1961, the catch by Canada and the United States was less than 8 million lb.

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 ABSTRACTER: M. F. Tripple

2.05 THERMAL INACTIVATION OF TYPE E BOTULINUM TOXIN

Licciardello, Joseph J., John T. R. Nickerson, Crystal A. Ribich, and Samuel A. Goldblith (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts)
Applied Microbiology 15, No. 2, 249-256 (March 1967)

Clostridium botulinum is capable of growing and producing toxin at refrigerator temperatures that are above freezing. Furthermore, the spores of C. botulinum are quite radioresistant, so a pasteurizing dose of ionizing radiation could hardly effect a significant degree of spore inactivation. These facts are considered a deterrent to the commercial adoption of radiation-pasteurization plus refrigeration for extending the storage life of marine products. The present study was undertaken to determine whether normal cooking procedures would adequately inactivate Type E C. botulinum prototoxin in radiopasteurized haddock fillets if the toxin were present initially.

The thermal inactivation time of Type E toxin in a haddock substrate was found to be strongly temperature dependent and the time-temperature curve to be linear over the 135°-160° F. temperature range investigated. At 135° F., inactivation took about 100 minutes; at 160° F., it took about 2 min.

To determine the adequacy of normal cooking methods for the inactivation of Type E toxin, the investigators either pan fried or deep fat fried haddock fillets

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 ABSTRACTER: E. R. Weissman

DEVELOPMENT OF AUSTRALIAN FISHERIES

PACIFIC COD TRAWL FISHERY

INCREASING MEXICO'S SHRIMP PRODUCTION

INACTIVATION OF BOTULINUM PROTOTOXIN

1.51

In recent years, the abundance has greatly increased. The arrival in Hecate Strait of a strong 1962 brood as 2-year-old fish in 1964 and as 3-year-old fish in 1965 played an important role in the increased fishing success in those years. Improved market conditions also contributed to the record fishery in Hecate Strait of about 20 million lb. of Pacific cod in each of the last 2 years.

The initial steps have been taken to develop a satisfactory technique for predicting the success of fishing for Pacific cod. The technique is based on the observed relation between the size of fish landed in a given year and the average fishing success in the succeeding year. It is tentatively predicted that catches in Hecate Strait during 1967 will be from below average to average, while catches off the west coast of Vancouver Island will be from average to above average. The prospects for Queen Charlotte Sound are very uncertain.

(Abstract of this article appears under 1.0143 page 3 - January 1967)

1.51 ICELAND: ANOTHER STEP NEARER THE CONTINENTAL SHELF?

Anonymous
World Fishing 15, 33-34 (May 1966)

2.05

0.5, 0.75, and 1.0 inch thick and measured the heat penetration rates. They found that the maximum temperature attained at the center of the fillet occurred not at the end of the cooking period but while the fillet was being drained. The heat penetration rates were correlated with the thermal-inactivation times to provide "lethality" curves for the different cooking treatments. The times previously determined to be sufficient to "cook" the fish (to the satisfaction of an organoleptic panel) were also sufficient to inactivate the toxin in the various sized fillets completely.

The authors then determined that an increase in concentration lengthens the thermal inactivation time for Type E toxin. The initial calculations of thermal inactivation time and lethality were made at a toxin concentration of 5,000 mouse LD_{50} per 0.5 ml. in haddock substrate (that is, each 0.5 ml. of haddock substrate contained enough toxin to kill 50 percent of 5,000 mice). This amount of toxin was produced in haddock fillets only when they were in an advanced state of decomposition; thus a margin of safety is present in the fillets.

In addition, the authors found that the lethal dose of Type E toxin taken orally was 50 to 100 times the lethal dose administered intraperitoneally, as was done in the original tests. This fact offers a further margin of safety.

The authors concluded that Type E botulism is not a public health hazard in radiopasteurized haddock fillets.

1.017

transport. The second phase occurred when the return of fishing vessels at the end of World War II resulted in a dramatic rise in effort and in landings. The third phase, marking the most recent increase in Australian landings, is almost entirely due to landings of bluefin tuna.

A number of molluscan and crustacean fisheries have developed markedly since 1945. Development of the prawn fishery is noteworthy--the increase has largely been achieved by extension of the area of operations. The most spectacular example of rapid development is in the Victorian scallop fishery. The newly developed abalone industry is showing expansion. Landings of crayfish in the Western and Southern States have risen. The development of these fisheries, particularly the crayfisheries, is the major cause of a 3,341 percent increase in marine exports; the value of marine products rose from $793,154 in 1946-47 to $27,296,000 in 1964-65. The benefit to Australia from the development of these fisheries can be estimated in terms of this increase.

The primary sector of the fishing industry has received many benefits from the development of the crayfish, prawn, scallop, abalone, and tuna fisheries. Because these fisheries provide raw material for processing, the benefits stretch into other sectors of the industry, such as to the canneries and processing establishments. Expansion in the fishing industry also stimulates the activity of boatyards and of gear and equipment manufacturers. Additionally, any development of the fishing industry that would reduce the amount of imported marine products (which exceeded $33.4 million in 1965-66) would strengthen the Australian economy.

1.85 (Cross Reference: 1.012, 9.16)

The region chosen for the farms is a stretch of the Sinaloa-Nayarit coastline between the Santiago and Presidio Rivers. The area includes seven large lagoons, several smaller lagoons, several canals, and some estuaries. Fresh water from the rivers can be released into the farms to control salinity. The waters are warm enough to eliminate the need for heating, and the climate allows cultivation the year round. The large lagoons make elaborate cement ponds with regulated temperatures and costly feeding programs unnecessary. In addition, they provide nutrients for the smaller brine shrimp that, according to the Japanese system, feed the larger commercial shrimp, Penaeus japonicus.

Mexican shrimpers exported $52,000,000 worth of their product last year. This amount made the product Mexico's fourth largest export.

(Abstract of this article appears under 2.12 page 7 - May 1967)

1.85 DEPTH DISTRIBUTION OF OCEANIC SHRIMPS (DECAPODA; NATANTIA) OFF OREGON

Pearch, William G., and Carl A. Forss
Journal of the Fisheries Research Board of Canada 23, No. 8, 1135-1143 (August 1966)

2.05 KINETICS OF THE THERMAL INACTIVATION OF TYPE E CLOSTRIDIUM BOTULINUM TOXIN

Licciardello, J. J., C. A. Ribich, J. T. R. Nickerson, and S. A. Goldblith (Dept. of Nutrition and Food Science, Massachusetts Institute for Technology, Cambridge, Massachusetts)
Applied Microbiology 15, No. 2, 344-349 (March 1967)

A small amount of "free" toxin and a much larger amount of prototoxin are the usual components of a toxic filtrate of Type E Clostridium botulinum. The prototoxin is the toxin of C. botulinum that becomes activated by trypsin and certain other proteolytic enzymes. The mechanism of this activation is not yet known. Several possible mechanisms have been suggested, including a fragmentation of the prototoxin into smaller units, the release of a small polypeptide in a manner analogous to that in which trypsin activates trypsinogen,or simply an unfolding of the molecule. Each basically postulates the exposure of more toxic sites on the prototoxin molecule.

In the present article, the authors investigate the thermal resistance of free toxin, prototoxin, and the trypsinized (or activated) toxin in order to confirm the conclusions of their previous article (1967), which was concerned with the thermal inactivation of the prototoxin alone.

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 ABSTRACTER: E. R. Weissman

2.116 SONAR: 20 YEARS LATE, B.C. TAKES TO "SIDEWAYS SOUNDING"

Richards, B. T.
Western Fisheries 73, No. 5, 24, 26, 28, 57, 58-59 (February 1967)

Sonar, an instrument for detecting objects in water by means of reflected sound waves, may be used as an aid to finding fish. Unlike echo sounders, which operate only vertically directly beneath the boat, sonar is capable of both horizontal and vertical sounding, with the emphasis on the former. Much luck is involved in finding fish with an echo sounder because, if the edge of a school of fish is detected, the captain must figure out where the main body of the school lies. With sonar it is possible to discover the location of the main body of fish, provided the operator has the skill to interpret the signals.

There are several reasons for the reluctance of British Columbia fishermen to adopt sonar, even though it has been used elsewhere for fishing for 20 years. First, sonar is relatively expensive and costs 3½ times more than an echo sounder. Second, many existing boats do not have the room for the apparatus. The underwater unit of sonar and its raising and lowering mechanism cannot simply be "stuck in" anywhere. If the unit is too far aft, it will pick up propeller noises; if the unit is too far forward, it may be damaged during heavy weather. With the trend to larger boats, finding room for a sonar unit will be less of a problem. New vessels requiring sonar should be designed with this requirement in mind. It would be a good idea to keep the proposed use of a vessel in mind when considering sonar because it is useless for bottom fish.

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 ABSTRACTER: E. R. Weissman

2.116 INTELLIGENT ECHO-SOUNDING

Oliver, Clive
World Fishing 16, No. 3, 41-44 (March 1967)

The echo sounder aboard a trawler shows the position of objects (such as seabed, sand eels, and fish) over which the vessel passes. To get the best use from the equipment, the skipper must interpret the echo-sounder charts and supplement the information on the charts with his own knowledge. The roll of the ship, the spread of the transducer beam, and other factors influence the interpretation of the echo sounder data.

The basic echo sounder is a great aid to the trawler captain, for it can minimize wasted fishing time. The more sophisticated echo-sounder equipment can virtually show a skipper where to shoot and how long to tow for the best results in a given area. One of the advanced systems combines the chart and cathode ray displays of the basic system with a third chart record on which the bottom 4 fathoms are shown in greater detail. This effect is achieved by a unique device that locks the display on the third chart record to the seabed regardless of pitch or bottom undulation. The secret of success when using this equipment, as in using the basic echo sounder, lies in intelligent and careful interpretation by the skipper.

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 ABSTRACTER: M. F. Tripple

2.12 PORT PHILLIP BAY SCALLOP CATCH PREDICTIONS

Sanders, M. J. (Fisheries and Wildlife Department, Victoria, Australia)
Australian Fisheries Newsletter 26, No. 1, 23-25 (January 1967)

A common method for determining changes in abundance of commercially utilized animals is to compare the catches per unit effort over a given period of time. This comparison is made for scallops by using the monthly return data from fishermen and graphing the number of bags of scallops caught per haul for a period of years. A more detailed estimate of scallop abundance may be compiled from monthly return data by graphing the catch per unit effort (number of scallops per haul) against the accumulated catch (numbers of scallops). This method, however, has various limitations, the most serious of which is that the scallops present in the area but not caught are obviously not included in the calculations. Thus the original abundance figure derived is an underestimate of the true abundance.

More direct estimates of scallop abundance were obtained from field surveys in Port Phillip Bay, Australia. Dredging was done on a 3- by 4-mile grid pattern in the bay. At each station a single 4-foot dredge was towed for 5 min. at a boat speed equivalent to 600 revolutions. The distance covered during this standard haul was 450 yards. Thus the area covered by the dredge during a standard haul was 600 square yards. The number of scallops caught and a gross measure of the total contents of the dredge were recorded at each station.

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 ABSTRACTER: M. F. Tripple

INACTIVATION OF BOTULINUM TOXIN

USE OF ECHO SOUNDERS

SONAR FOR FINDING FISH

PREDICTING SCALLOP CATCHES

2.116 (Cross Reference: 2.146)

One successful skipper uses what he calls a "calibration tow" during which he tows for about 2 hours and watches the signals on the cathode ray display of the echo sounder. At the end of the tow, when the trawl is back on deck, the skipper estimates where the heaviest concentration of fish lay during the tow. He judges the position of the fish by referring to the sounder chart. He can see on the expanded scale chart how the fish were lying at any time during the tow. From this information, he can then select the next area in which to fish by deciding where the fish were thickest within trawling height from the bottom and by taking into consideration currents, tide, and other factors influencing where the fish are going to be for the next run. By shooting at a carefully calculated point, he can haul again after only a few minutes' towing and know that he is going to come up with a full net.

2.12 (Cross Reference: 1.84)

To relate the number of scallops caught with the density of scallops on the bottom, the author undertook diving trials in conjunction with the dredging. A diver equipped with a square-yard measure recorded scallop density along a measured rope placed on the bottom. A standard haul was then made over this area; the number of scallops caught and a measure of the total contents of the dredge were recorded. This procedure was repeated a number of times at different locations in the bay. The efficiency of the dredge during a standard haul varied from 4 to 49 percent, depending on the density of scallops and on the amount of rubbish in the area. To adjust for the variation in dredge efficiency in different areas, the author established a relation between dredge efficiency and the total contents of the dredge. The relation was used to convert the number of scallops caught per standard haul at each station to the density of scallops on the bottom. The average density of scallops in each statistical block was calculated as the average of the scallop densities at each station within and on the perimeter of the block. The total number of scallops in each block was then calculated from the average density of scallops in each block times the area of the block.

The number of takable scallops was defined as those available; a catch rate equal to or greater than two bags of scallops an hour was used for a boat towing two 4-ft. dredges. This catch rate corresponded to a density on the bottom of 0.23 scallops per square yard at the prevailing level of dredge efficiency. The number of takable scallops in each grid block was then calculated as the number of scallops in excess of the density of 0.23 scallops per square yard.

2.05

Curves of thermal-inactivation time for the three types of Type E toxin were plotted. The curves for the prototoxin and the activated toxin practically coincided, and the slopes of all three were similar. The authors concluded that the temperature requirements for inactivation of the prototoxin and the activated toxin are identical.

The inactivation rates of the different toxin forms were plotted. Again, the curves for the prototoxin and the activated toxin were similar; when the curve for the free toxin was shifted upward until its initial titer coincided with the initial titer of the prototoxin or activated toxin curves, all three curves coincided. The authors conclude that the thermal inactivation requirements of all three forms of the toxin are the same.

When the curves illustrating rate of destruction were plotted as a first-order reaction, they were found to be nonlinear. Additional studies were conducted to show whether this phenomenon was related to the temperature of inactivation. Each rate-of-inactivation curve had two components: an initial steep curve in which 99 percent of the toxin was inactivated and a more horizontal curve after that point. Thermodynamic parameters were calculated for the two different inactivation rates for inactivation temperatures ranging from 125° to 145° F. The energy of activation was found to be low at the lower temperature and high at the higher temperature.

2.116

Study and patience are needed by the operator in order to make sonar a valuable tool. The sound beam will be reflected by almost anything. Since the beam sweeps horizontally, its upper edge will pick up floating objects, waves, the wake of vessels, and surface fish. It may be extremely difficult to sort out the fish. In order to avoid spurious surface signals, the operator may slightly lower the beam, but then bottom reflections will be picked up. It is necessary for the operator to know bottom conditions so that he may distinguish fish from the bottom. Other problems of interpretation may also be encountered, and preliminary exploration of a fishing ground by sonar may be the way to handle them.

The sonar sets available for commercial fishing display information in one of two ways, either on a paper chart or on an oscilloscope. The paper chart offers a permanent record for use in analyzing the fishing ground, but it does not give the angle of the transducer relative to the keel line or the heading of the boat. Although the cathode ray tube, or oscilloscope, gives a complete underwater picture at one sweep, it offers no permanent record for later analysis.

2.12 INCIDENTAL CATCHES OF FINFISH IN SEA SCALLOP DREDGES ON GEORGES BANK

Wigley, Roland L., and Henry W. Jensen (Biological Laboratory, Bureau of Commercial Fisheries, Woods Hole, Massachusetts)
Commercial Fisheries Review 29, No. 7, 63-70 (July 1967)

During scallop fishing, commercial fishermen catch a wide variety of incidental flatfishes. Using a standard commercial scallop dredge 3.05 m. wide with 5 cm. rings in the dredge bag, the present authors sampled three sectors of the Georges Bank region to determine the composition and the size of this incidental catch. Hauls were made from the R/V Delaware in depths of between 51 and 137 m. Towing speeds were varied in increments of 0.4 knots from 1.4 to 4.6 knots.

The number of fish caught per haul was greatest (34.2 average) near the western sector of Georges Bank, second (29.2) in the southern sector, and least (15.6) in the eastern sector. As a rule, the number of fish caught increased with the speed of tow--the average catch was about 8 fish per haul at 1.4 knots; at 4.6 knots, it increased to 42 fish per haul.

Assuming that the catch for commercial vessels fishing in the New England-Nova Scotia area would be comparable to that of the Delaware and using fishery statistics published for the years 1959-1962, the authors estimated the finfish that were caught on Georges Bank by commercial scallop fishermen. A percentage breakdown of the 20,000,000 total appears on the back of this card.

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 ABSTRACTER: L. Baldwin

2.1475 CATCH AND NUMBER OF HAULS IN RELATION TO THE PRINCIPAL PARTICULARS OF THE DANISH SEINERS OF A BERING SEA FISH-MEAL FLEET

Maéda, Hiroshi, and Shiro Minami (Laboratory Fishery Technics, Department of Fisheries, Shimonoseki University Fish., Shimonoseki, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 3, 176-180 (March 1967)

Although several of the important fishing conditions were identical, the average daily catch varied widely among individual members of a 22-boat fleet of Danish seiners. The seiners all fished around a single mother ship, used nets of identical construction supplied by the mother ship, and based their fishing on common knowledge of the fishing conditions derived from frequent intercommunication. A number of factors having a possible bearing on the catch variations are analyzed for the purpose of determining why the catch rates varied so widely.

The average daily catch per vessel ranged from less than 24 tons to more than 32 tons. The average number of hauls made each day ranged from about 7.05 to about 8.05. No correlation was found between the average number of hauls per day and the average daily catch.

Other factors that were considered as relevant to the problem of catch variations were the length, breadth, and gross tonnage of the vessels, power of main engine, tank capacities, number of crew members, and the launch date of each

(over)

 ABSTRACTER: E. R. Weissman

2.1471 TWO-BOAT MIDWATER TRAWLING FOR HERRING --WHY NOT TRY IT IN CANADA?

Thomson, David B. (Department of Nautical Science, College of Fisheries, St. John's Newfoundland)
Canadian Fisherman 54, No. 5, 31-32 (May 1967)

The author suggests that the Canadian longline fishermen presently converting to purse seining should consider converting to two-boat midwater trawling instead. The primary reason given for choosing trawling rather than seining is the cost difference. The equipment required for purse seining is much more expensive than the equipment used in two-boat trawling.

The most successful two-boat midwater trawl has been the Larsen trawl. This net is particularly suited for use by small, low-powered vessels. The Larsen net is made up of four identical panels. The most common size is the 15-meter model, which refers to the size of the net's mouth (15 m. x 15 m.).

The author states that two longline vessels, each about 50 feet in length and powered by 100 hp., would be an ideal pair for towing a Larsen midwater trawl. The vessels would need a simple two-barrel winch, two rail rollers, and possibly a derrick for raising the cod end. This equipment would cost much less than the power block and skiff necessary for purse seining. The complete net for two-boat trawling would cost about $1,000 as compared to between $10,000 and $20,000 for a purse seine.

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 ABSTRACTER: E. R. Weissman

2.15 AUTOMATED HERRING HANDLING

Anonymous
World Fishing 16, No. 3, 50-52 (March 1967)

Innovations aboard a new East German herring stern trawler automate the handling, freezing, and storage of the catch. The herring are initially loaded into two precooling tanks, each holding 8 tons of fish and kept at 0° C. by power-circulated, chilled brine. Use of two tanks reduces pressure on the fish from bulk handling, and the precooling relieves the load on the freezers and increases their output. The herring are removed from the tanks by an "airlift" pump, which is part of an overall system used throughout the vessel and which is claimed to reduce damage to the fish and to provide a washing action. The airlift deposits the fish on a sorting belt; during the sorting operation, the fish are plowed off the sorting belt into the grader. The fish fall into three collection bunkers, each of which contains a complete load for one of the three freezers. The airlift system also transports the fish to the freezer by depositing them from the bunkers back on the sorting belt, from which they move onto a transverse conveyor. The conveyor travels along the length of the vertical-plate freezer and fills each station in succession.

Each of the three vertical-plate freezers has 36 stations that produce 49-pound blocks of fish. The direct evaporation freezing system gives the frozen blocks a core temperature of -22° C. Total freezing capacity of the three freezers is 21 tons per day. The freezers discharge by opening their bottom flaps; the

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 ABSTRACTER: M. F. Tripple

2.1471

Each of the two vessels pulls two side warps, one upper and one lower. The vessels normally stay apart a distance that is equal to one-half the warp length. Varying this distance allows the fishermen to control the depth and speed of the trawl. The net will tow higher if the distance between the boats is increased and lower if the distance is decreased. Decreasing the distance results in more towing speed. Varying the length of the warps also affects the depth at which the net rides. The normal allowance is 7 fathoms of warp for each fathom of depth desired, though it is unusual for less than 75 fathoms of warp to be used.

As the warp length is varied, the upper and lower wires must be adjusted to maintain the net in a proper attitude. For up to about 100 fathoms of warp, the upper wire must be slightly longer than the lower; from 125 to 175 fathoms, the two wires must be equal in length; at over 200 fathoms, the lower wire must be longer. A table of approximate warp adjustments is given. When one boat is more powerful than the other, it should take the starboard side of the net.

Two-boat midwater trawling is carried out both by day and by night. When the fish are scattered, the towing period is extended. Catches of more than 50,000 pounds of fish in one haul are not uncommon.

2.15

blocks fall to a receiver below and are tipped onto a conveyor belt. The blocks pass through a glazing process and are then packed in a polyethylene film. The entire freezing system is under the control of one man.

After leaving the processing room, the wrapped blocks pass through a tunnel to the fishhold, where stowage is completely mechanized. Passing longitudinally through the fishroom is a conveyor belt, which delivers the blocks alternately to port and starboard, moving forward by steps as each pair of rows is filled. When the hold is covered one block deep, the entire conveyor system is indexed up one step and the process is repeated. The blocks follow guide rails placed on each layer. Total capacity of the fishhold is 250 tons. The average time required to stow one complete layer of blocks is about 7 hours; only 7 percent of the total working time is manual. Of interest is the fact that the system can be operated in reverse to unload the vessel in port. It operates at a rate of 15 tons of frozen fish per hour. An additional unloading device is positioned under the hatch when the frozen catch is being discharged.

2.12 (Cross References: 1.79, 1.9)

Incidental finfish caught in scallop dredges

Fish caught	Percent of catch	
	Delaware	Commercial
Skate, Raja sp.	51.5	50.0
Yellowtail flounder, Limanda ferruginea (Storer)	10.7	13.2
Other flatfish--windowpane, Scophthalmus aquosus (Mitchill); winter flounder, Pseudopleuronectes americanus (Walbaum); witch flounder, Glyptocephalus cynoglossus (Linnaeus); fourspot flounder, Paralichthys oblongus (Mitchill)	5.4	6.1
Squirrel hake, Urophycis chuss (Walbaum), including about 5 percent white hake, Urophycis tenuis (Mitchill)	8.4	7.2
Sculpin, Myoxocephalus sp.	7.6	8.8
Goosefish, Lophius americanus Valenciennes	6.9	6.8
Haddock, Melanogrammus aeglefinus (Linnaeus)	4.6	4.7
Miscellaneous fish (ocean pout, Macrozoarces americanus, Bloch and Schneider; sea raven, Hemitripterus americanus, Gmelin; lumpfish, Cyclopterus lumpus, Linnaeus; northern searobin, Prionotus carolinus, Linnaeus; Atlantic cod, Gadus morhua, Linnaeus; Atlantic wolffish, Anarhichas lupus, Linnaeus; Atlantic herring, Clupea harengus, Linnaeus; spiny dogfish, Squalus acanthias, Linnaeus; and silver hake, Merluccius bilinearis, Mitchill)	4.9	3.2

2.1475

individual vessel. Nonquantifiable factors that were considered as relevant included the material from which the hull was made, the type of engine, the home port, and the type of electronic gear carried by each vessel. Two of these factors appeared to have a direct connection with the performance of the vessels: the size of the main engine and the home port of the vessel.

The average daily catch tended to rise as the power of the main engine increased. The vessels used power from the main engine not only for propulsion but also for hauling the net. The authors believe that the dependence of the catch size on the size of the engine is a function of the greater hauling power of the larger engine rather than any difference in power for dragging the net. They suggest that an investigation should be conducted to determine whether a larger engine yields a larger catch at all depths fished.

All the vessels used echo sounders to locate the fish. Four of the vessels used a type of echo sounder that differed from those used by the other vessels; all four of these vessels had a low average daily catch. However, they were also from a different home port and had less powerful engines than vessels of similar tonnage. The authors found it difficult to tell which of these factors or combination of factors affected the vessels' catches.

2.3 POSTMORTEM PHYSICOCHEMICAL CHANGES IN UNFROZEN NEWFOUNDLAND TRAP-CAUGHT COD

MacCallum, W. A., June I. Jaffray, and D. N. Churchill (Fisheries Research Board of Canada Technological Unit, St. John's Nova Scotia), and D. R. Idler and P. H. Odense (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 3, 651-676 (March 1967)

About 70 million pounds of Newfoundland cod are frozen annually. The handling of the fish from traps to freezers and the quality of the frozen, stored pack may be related to production problems and the quality of the product. This report discusses the physical and physicochemical features associated with handling of the cod.

Cod (Gadus morhua) caught in traps along the shores of Newfoundland are high in muscle glycogen, which reaches a peak in late July. Unfrozen Newfoundland cod caught in traps reach a lower pH post mortem than cod caught in other Newfoundland fishing operations. Sea-water temperature, muscle glycogen at death, and free drip development in the fillets were minimal in June and maximal in late July. After freezing and during rigor, the fillets of fish caught in late July were of significantly poorer texture than those prepared earlier and later in the season.

The fish that were not iced at capture entered rigor mortis within 2 hr. and, although these fish were iced in the interim, they were out of rigor in 24-36 hr.
(over)

 ABSTRACTER: M. F. Tripple

2.5 WEATHER FACTORS AFFECTING ENVIRONMENTALLY-CONTROLLED TRANSPORTATION OF PERISHABLE COMMODITIES

Jung, Paul J. (Trailmobile Division, Pullman Inc., Cincinnati, Ohio)
ASHRAE Journal 9, No. 7, 57, 63 (July 1967)

The container of a container-handling system has an enclosed body with detachable wheels that convert the container to a trailer for highway use. The container can be lifted off its wheels by cranes and transferred to a railway car, ship, or modern cargo plane. The advantage of a container system is the ability of loading cargo at the point of origin, transporting it any distance, and then directing it to its final destination without rehandling the cargo. Along with the developments in container handling systems has come a parallel development in insulation that promises to completely change perishable transportation practices. Foam-in-place insulation of polyurethane has set new high-thermal efficiency standards for the transportation industry.

The author suggests that frozen foods can be shipped without supplemental refrigeration. This suggestion becomes meaningful when one considers the large quantities of heat that must be removed from food for the initial freezing and the additional heat that must be taken out to reduce the temperature to zero or below. Once the food is frozen, considerable heat can be absorbed before the temperature of the food rises significantly. The cargo in effect is a huge heat sink that is capable of maintaining itself. The only problem in transporting frozen food is the heat entering the walls of the container.
(over)

 ABSTRACTER: M. F. Tripple

2.3 (*) DEBONING MACHINE RECOUPS 50% OF 'WASTE' FROM FISH SKELETALS

Samuel, O. C.
Food Processing and Marketing 28, No. 7, 92 (July 1967)

A machine that automatically debones fish and increases the edible yield per fish is now available to the fish-processing industry on a rental basis that includes maintenance. A similar machine for deboning poultry is already in widespread use.

Beheaded and eviscerated fish are ground through a plate with holes that can be varied in size to suit the particular species or sizes of fish or fish parts being processed. Whitefish are ground through a plate with holes about 3/8 inch in diameter. The ground fish then go to a separator unit where the edible tissue is separated from waste material. Edible tissue is expelled from one end of the machine, and the bones, scales, fins, and other waste material are expelled from the other end. The resulting fish tissue is in a finely cut state and may be used in boneless poultry-style cuts, cutlets, rolls, croquettes, fishburgers, baby food, fish sticks, fish "wieners," or sausage-type products.

Yields of proteinaceous tissue from beheaded eviscerated fish put through the machine vary from 70 to 80 percent by weight, depending on the size of the fish.
(over)

*Item on back of card.

 ABSTRACTER: E. R. Weissman

2.05 SURVEY OF THE U.S. GULF COAST FOR THE PRESENCE OF CLOSTRIDIUM BOTULINUM

Ward, B. Q., B. J. Carroll, E. S. Garrett, and G. B. Reese (Technological Laboratory, U.S. Bureau of Commercial Fisheries, Pascagoula, Mississippi 39567)
Applied Microbiology 15, No. 3, 629-636 (May 1967)

Prior to the botulism incidents in 1963, the presence of Clostridium botulinum Type E in the Great Lakes was merely of academic interest. The possibility of botulism occurring in the Gulf Coast was considered unlikely. In 1963, however, reports were received from Texas on an isolation of Type E, and investigations were begun on the overall incidence of C. botulinum in shellfish from the area. The authors felt that a comprehensive investigation of the Gulf Coast potential for C. botulinum should also be undertaken. A short survey of Galveston Bay, which disclosed the presence of Type E, supported the need for such an investigation. Therefore, the authors initiated a comprehensive study of incidence and distribution of C. botulinum Type E in southern waters.

Both brackish and fresh-water areas were sampled; major emphasis was placed on the brackish environment, and fresh-water or near fresh-water collections were restricted to the Mississippi River and a few larger lakes. Bottom samples, plant material, and animals were taken as the opportunity presented itself. Collections were made at numerous points in the Gulf between Key West, Florida, and Brownsville, Texas.
(over)

 ABSTRACTER: M. F. Tripple

POST-MORTEM CHANGES IN COD

FISH DEBONING MACHINE

TRANSPORTATION OF PERISHABLE COMMODITIES

PRESENCE OF CLOSTRIDIUM IN U.S. GULF COAST AREA

2.1

The yield from fish remains after filleting is about 50 percent by weight. Maximum yield calculations of this magnitude make it economically attractive to consider fish farming in terms of raw fish flesh production as the net result of investments in fish raising and feeding. At present, fish farming is confined to species that can easily be boned by hand, although these are not the species that show the best gains in edible content from feeding.

Another area in which the fish deboning machine may prove useful is in the production of fish protein concentrate. For esthetic reasons, some people object to the present practice of using the entire fish, including entrails and fecal matter, to make the concentrate, even though the finished product is wholesome and nutritious. With the deboning process, the objectionable matter is removed from the fish before the fish is put through the deboning machine.

2.3 STEINKOPF HERRING FILLETING MACHINE

Anonymous
Norwegian Fishing and Maritime News 13, No. 3, 41 (1966)

This processing machine is capable of filleting up to 75 herring per minute with a single operator. The fish is beheaded and, if desired, the tail is removed. The strip of flesh on the belly, the roe, and the testes are removed. The backbone and ribs are cut away, and the herring is split into fillets. The machine may be set to allow the fillets to hang together in the back. The cutting knives may be adjusted to accommodate various lengths of herring.

[Abstracter: E. R. Weissman]

2.3

Fish iced immediately after capture were in full rigor 8-15 hr. later and, although rigor did not completely disappear for 70-90 hr., the fish could be hand filleted in 24 hr. There were small weight losses in whole eviscerated fish that were not iced until several hours after capture; however, this weight was completely regained after 34 hr.

Whole, eviscerated fish that were iced at capture developed less drip in the fillets than did the fish that were permitted to warm before icing. The drip in fillets in all stages of rigor consistently increased with decreasing pH at the time of filleting. The pH levels in turn were dependent on season and on glycolysis after killing. The muscle glycogen in late midseason catches on August 2 appeared to be directly responsible for pH drop. Feed, physiological condition, and sea-water temperature appeared to be the principal catalysts of pH change in fish captured earlier. Fillets from August catches prepared during rigor showed no further drop in pH from that of the original, iced fish and developed 2-3 percent free drip in 24 hr. The pH in fillets processed before or after rigor mortis dropped further than it did in the whole fish, and drip development was much greater than in samples filleted during rigor. Considerable variability was noted in the rate of rigor development in any one catch so that the particular state of rigor at filleting was found to correlate better with the amount of free drip in the fillets than did post-mortem age. The development and resolution of rigor in fillets was accompanied by considerable reduction in the solubility of the proteins in 0.6 M NaCl solution, and the reduction was significantly higher than in whole fish.

It is the conclusion of the authors that if trap fish must proceed into rigor before freezing, these fish should be chilled and stored in the whole, eviscerated state, rather than as fillets. [21 references]

2.05

Results of testing animal samples collected during the warm months showed a definite disparity of the incidence of C. botulinum between eastern and western estuarine waters of the Gulf. The incidence of botulism in the eastern samples was appreciably higher than its incidence in the west. Type A was never detected in the warmer months. Predominantly Type E botulism was detectable within the geographic limits of the United States from Florida Keys in the east to Brownsville in the west.

Results of testing samples collected during cold weather were quite unlike those noted with warm-weather samples. The overall east-west differential was minimized, Type E no longer predominated, and the overall incidence was also lowered. In eastern specimens collected during the summer, the incidence of all types of botulism was 5.1 percent; the incidence was 3.3 percent in western samples. The percents of incidence for winter collections were only 1.8 and 1.9 for east and west, respectively. Incidence figures for the entire year indicated a greater overall risk of contamination by C. botulinum in the eastern Gulf and a definite decline in any such potential danger during cooler months.

Examination of sediments showed that mud, sand, and shell seemed to be equally liable to contamination; however, incidence seemed to be reduced in all cases of mixed sediments. When figures for the entire year were considered, the sediments from the west contained more of the organisms than did those of the eastern Gulf and the incidence figure for winter exceeded that of summer.

The specific types of C. botulinum found in all the samples were restricted; Type F was detected once, Type A and Type B appeared three times, Type D appeared six times, and Type C was detected nine times.

2.5

A 40,000-pound load of frozen food precooled to -10° F. would still be below zero after 2 days of storage if the food were in a typical container subjected to average weather conditions. If the same load were precooled for -100° F. with liquid nitrogen, about 15 days of transit time would still leave the cargo safely frozen. Trips of longer duration would be possible if the thickness of insulation were increased. Once the container is loaded and in transit, environmental temperatures, wind conditions, and humidity enroute would have a direct bearing on heat transfer. The shipper would have to know in advance about weather conditions at each point of the shipment itinerary. Using these data, the shipper would adjust the initial temperature of the cargo before loading to insure a satisfactory product at arrival.

The author feels that the proposal is definitely feasible. The use of containers will shorten transit times, particularly when intermodal transfers are necessary. Through-shipments without delays in handling could move on accurate timetables, which is a necessary requirement for the plan. Shippers should be in possession of average weather data for major transportation routes for all year. These data should include the mean temperature that is anticipated for any given itinerary. The author is aware that the weather prediction data mentioned are more complex than they would appear to be. Because the vehicle is in motion, continuous weather data are required for the air envelope surrounding the moving transport. If this problem could be effectively solved, transportation of perishables by the proposed method could become a reality.

2.05 (*)

CLOSTRIDIUM BOTULINUM IN MARINE SEDIMENTS AND IN THE OYSTER (CRASSOSTREA VIRGINICA) FROM MOBILE BAY

Presnell, M. W., J. J. Miescier, and W. F. Hill, Jr. (Gulf Coast Health Sciences Laboratory, U.S. Public Health Service, Dauphin Island, Alabama 36528)
Applied Microbiology 15, No. 3, 668-669 (May 1967)

The presence of Clostridium botulinum Type E in the oyster Crassostrea virginica has not previously been reported, nor has Type E been previously isolated from marine sediments in Mobile Bay, Alabama. This study records the finding of C. botulinum Types C, D, and E in marine sediments and Type E in oysters from Mobile Bay.

Marine sediment samples and oyster samples were collected from five sampling stations in Mobile Bay to establish a possible correlation between the occurrence and distribution of C. botulinum and natural variations in the estuarine environment. The sampling stations were located so that a variety of hydrographic conditions could be monitored; the depth of water at the stations varied from 3 to 5 feet. From August 1965, to June 1966, 74 samples each of marine sediments and oysters were simultaneously collected at each sampling site. The oyster and sediment samples were inoculated into a modified, cooked meat medium, All the media showing growth were screened for the presence of heat-labile toxins by the mouse bioassay test. Toxins were identified by mouse cross-protection tests in which antitoxins of Types A, B, C, D, and E were used.

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*Item on back of card.

 ABSTRACTER: M. F. Tripple

3.12

SELECTION OF MICROBIAL POPULATION IN CHLORTETRACYCLINE-TREATED OCEAN PERCH (SEBASTODES ALUTUS)

Lee, J. S., and R. O. Sinnhuber (Department of Food Science and Technology, Oregon State University, Corvallis 97331)
Applied Microbiology 15, No. 3, 543-546 (May 1967)

Considerable information is available on the storage characteristics and spoilage of tetracycline-treated fish; however, little effort has been made to examine the resultant microbial population and to determine the antibiotic sensitivity of the individual microorganisms. The authors observed that the changes in the microbial population of chlortetracycline (CTC)-treated ocean perch, with the exceptions of gram-positive bacteria and yeasts, were not appreciable. The Pseudomonas species of the gram-negative bacteria were more readily inhibited by CTC than were the species belonging to the genera Achromobacter and Flavobacterium. Pseudomonas species, however, increased in number during storage at 7° C. Microorganisms were isolated from both untreated and CTC-treated perch and identified; CTC sensitivity was tested individually to determine the response of each organism to CTC and to examine the degree of selection due to CTC. Five CTC sensitivity groups were determined by the size of the inhibition zone produced against 1.5 µg. of CTC.

Microorganisms isolated from untreated ocean perch contained about equal numbers in each CTC-sensitivity group. The shift to a more CTC-resistant population. did not occur until the concentration of CTC reached 500 p.p.m. The proportion of

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 ABSTRACTER: M. F. Tripple

3.12

COMPARATIVE EFFECTS OF CHLORTETRACYCLINE, FREEZING, AND γ RADIATION ON MICROBIAL POPULATION OF OCEAN PERCH

Lee, J. S., Crystal L. Willett, Sarah M. Robison, and R. O. Sinnhuber (Department of Food Science and Technology, Oregon State University, Corvallis)
Applied Microbiology 15, No. 2, 368-372 (March 1967)

The microbial populations living on ocean perch were examined so the comparative effectiveness of low-dose irradiation could be compared with existing methods for fish preservation. The fish involved in this study were either irradiated, treated with chlortetracycline (CTC), or freeze-stored. Although CTC is known to be an effective preservative, little is known about the effect it has on the microbial population of fish.

Samples of frozen perch (Sebastodes alutus) were stored at -15° C. After storage for 1 month, about 17 percent of the initial microbial population was dead. The reduction was uniform among the gram-negative species found on the perch but varied among the gram-positive species. Bacillus, Lactobacillus, and Micrococcus were less resistant to freezing than the coryneforms were.

The legally permissible concentration of CTC (5 parts per million) had little effect on the microbial population of the perch. The effect of 50 p.p.m. was comparable to that of freezing, especially on the gram-positive species. The effect on the gram-negative species was more pronounced, particularly on the Pseudomonas

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 ABSTRACTER: E. R. Weissman

3.12

EFFECT OF FOOD ADDITIVES AND IRRADIATION ON SURVIVAL OF SALMONELLA IN OYSTERS

Shiflett, Maureen A., J. S. Lee, and R. O. Sinnhuber (Department of Food Science and Technology, Oregon State University, Corvallis 97331)
Applied Microbiology 15, No. 3, 476-479 (May 1967)

Low-dose irradiation of seafood prolongs the refrigerated storage life, but it does not eliminate all the microorganisms. Therefore, attempts have been made to enhance the effectiveness of radiation through combined use of chemical additives and antibiotics. Sodium benzoate prolongs the outgrowth of spoilage organisms in irradiated Dover sole. The outgrowth time of Clostridium botulinum Type E is doubled when 0.1 percent benzoate is added to fish homogenate. The authors investigated the effect of sodium benzoate and potassium sorbate on Salmonella inoculated into oysters stored at 7° C.

Both raw and autoclaved blended oysters (Crassostrea gigas) were inoculated with Salmonella enteritidis and S. typhimurium. The inoculated oysters were treated with 0.1 percent of either sodium benzoate or potassium sorbate; oysters treated with preservatives were either irradiated at 0.1 Mrad or not irradiated. The oyster samples were stored at 7° C. and examined at intervals.

The percentage of recoverable S. typhimurium in nonirradiated, raw oysters stored at 7° C. decreased rapidly. Three steps occurred in the loss of viability of S. typhimurium: (1) initial reduction during the early stages of storage; (2) gradual reduction from the third to the tenth day; and (3) rapid loss of viability

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 ABSTRACTER: M. F. Tripple

3.12 (Cross References: 3.15, 3.2494

species. Thus, treatment with 50 p.p.m. CTC produced a microbial population containing a higher percentage of coryneforms and Flavobacterium.

Irradiation with 0.1 Mrad reduced the microbial population of the perch by a factor of 100. Pseudomonas was the most susceptible group. The postirradiation microbial flora was dominated by Achromobacter species.

The once-frozen and CTC-treated fish were allowed to incubate at 7° C., as were the untreated fish. Pseudomonas did not grow as rapidly in the treated fish as in the control. Achromobacter took the place of Pseudomonas in the treated fish. Freezing was more inhibitory against microbial growth than treatment with CTC was.

As the concentration of CTC was increased (to 100, 200, and 500 p.p.m.), a higher percentage of the remaining microbial population was composed of coryneforms and Flavobacterium species. Achromobacter species and yeasts were also plentiful, though their recovery was not dependent upon the CTC concentration. Pseudomonas eventually regained predominance among the microbial flora and constituted about two-thirds of the terminal flora.

The effect of irradiation was of a different magnitude than that of CTC. Not only was the initial microbial population more severely reduced, but the terminal population was of a significantly different composition than that of the frozen and CTC-treated samples. Ninety-six percent of the terminal population on the irradiated perch was Achromobacter species.

3.12

after the tenth day. The S. typhimurium that survived in irradiated samples also underwent early rapid reduction. After the eighth day of storage, the percentage of S. typhimurium recovered from the nonirradiated sample treated with 0.1 percent sodium benzoate was noticeable; a similar phenomenon was seen with 0.1 percent potassium sorbate at an earlier storage period. Sodium benzoate and potassium sorbate were also conducive to better recovery of S. typhimurium from irradiated samples. After 7 days' storage, S. typhimurium was not recovered from the irradiated sample that had not been treated with additives, but it was still recoverable after 9 days in the benzoate-treated sample and after 10 days in the sorbate-treated sample.

The effect of sodium benzoate was the same with S. enteritidis. In untreated oysters, S. enteritidis underwent an initial period of rapid decline, followed by a period of slow decline in untreated oysters. The effect of sodium benzoate was more pronounced in the irradiated sample, especially after 4 days of storage.

Autoclaving the oysters eliminated reduced competition from natural flora, which might cause increased survival of Salmonella in the presence of additives. In the untreated autoclaved sample, S. typhimurium was recoverable in greater percentages when potassium sorbate was present. More S. enteritidis was recoverable in the presence of sodium benzoate than without the additive. The effects of additives on Salmonella were not altered by irradiation.

The survival characteristics of S. typhimurium and S. enteritidis in phosphate buffer showed a prolonged viable state in the presence of benzoate in buffer suspension. The evidence indicated a direct interaction between benzoate and Salmonella species. [8 references]

2.05

Demonstration of a specific toxin in an inoculated medium showed that three marine sediment samples and two oyster samples were positive for C. botulinum; 4.1 percent of the sediment samples and 2.1 percent of the oyster samples were positive. The positive samples yielded only C. botulinum Type E. The three positive sediment samples yielded Types C, D, and E, with only one type being isolated from each of the three positive samples. All the positive sediment samples were collected from two stations, and Type C and D were obtained from the same station. One positive oyster sample was collected from the same station that yielded the sediments positive for Types C and D. The other positive oyster sample was obtained from a station that yielded only negative sediment samples. Positive results were not obtained from sediment and oyster samples that were simultaneously collected from the same station.

It was interesting to note that the initial recovery of C. botulinum occurred after the estuarine environment was influenced by increased runoff of fresh water. Continued sampling would be necessary to establish precisely the influence of environmental variation on the occurrence and distribution of C. botulinum in the test area.

3.12

CTC-resistant organisms in perch treated with CTC increased with the time of storage at 7° C. The increase of resistant microorganisms also increased with concentration of CTC.

The CTC sensitivity of microorganisms was studied within the generic groups present in the CTC-treated fish. A total of 171 Pseudomonas species were isolated from various CTC-treated ocean perch. Ocean perch produced species that were quite resistant to CTC; more resistant species were recovered after treatment with higher concentrations of CTC. A similar pattern was seen among the Pseudomonas Type I species; however, Pseudomonas Types III and IV contained more CTC-susceptible species than did Pseudomonas Type II. Over 70 percent of the Pseudomonas species from perch treated with 500 p.p.m. of CTC and stored for 6 days were in the most CTC-resistant group.

The examination of 85 Achromobacter species showed a similar CTC-sensitivity distribution. There were more CTC-susceptible species of Achromobacter, and the selective effect of CTC on Achromobacter was less pronounced than with Pseudomonas. The CTC sensitivity of Flavobacterium was more varied and the Flavobacterium genus was more susceptible to CTC than either of the other species. A total of 19 percent of the Flavobacterium isolates from perch treated with 500 p.p.m. of CTC belonged to group I. A proportional increase in the resistant species took place when the CTC-treated fish were stored at 7° C.

The wide differences in CTC sensitivity among species within a genus indicate a possibility of accumulating CTC-resistant species in CTC-treated seafoods. However, it is unlikely that the extent of CTC-resistant species accumulating in treated marine products would be as apparent as the results of this study indicate. It is conceivable that extensive application of CTC in the fisheries industry would favor the accumulation of more CTC-resistant species in nature.

3.2490 QUALITY OF PACIFIC COAST DOGFISH DURING FROZEN STORAGE

Boyd, J. W., B. A. Southcott, and P. J. Schmidt (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 24, No. 3, 527-535 (March 1967)

Reports have been published concerning the quality of nonfrozen dogfish during storage; however, a survey of the literature showed that there was a dearth of information concerning the development of oxidative rancidity and color changes in frozen dogfish during storage. Consequently an experiment was carried out to assess the stability of dogfish muscle during frozen storage for 4-5 months. This paper presents information on rancidity development, color changes, protein denaturation, and lipid hydrolysis in frozen dogfish.

Pacific coast dogfish (Squalus suckleyi) were skinned, frozen, glazed, and stored at -5, -10, -20, and -30° C. for varying periods of time. Belly flaps from dogfish were tested under similar conditions. Oxidative rancidity in the frozen muscle was determined by organoleptic evaluation of thawed samples and by determination of the peroxide value of extracted lipids. Protein denaturation, total protein nitrogen, total lipid, and free fatty acid formation were determined. Color changes were assessed by visual examination of the outer surfaces of skinned carcasses and belly flaps under an incadescent lamp.

The results indicate that discoloration of red outer muscle of skinned frozen dogfish during storage was the first noticeable deterioration in quality.

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 ABSTRACTER: M. F. Tripple

4.13 (*) SEASONAL CHANGES IN FATTY ACID COMPOSITION OF COD LIVER, FLESH, ROE, AND MILT LIPIDS

Jangaard, P. M., R. G. Ackman, and J. C. Sipos (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 3, 613-627 (March 1967)

The fatty acid compositions of lipids from an isolated population of inshore cod (Gadus morhua L.) were determined monthly on pooled samples of representative fish. Cod-liver oil was studied over a period of 17 months, cod flesh was studied for 12 months, and the fatty acid compositions of milt, roe, flesh, and liver lipids were determined from some large, individual fish.

The fatty acids of flesh lipids were independent of the sex of the fish and showed little, if any, seasonal changes except a slight variation in the long-chain monounsaturated acid 20:1, which had a maximum of 2.8 percent in contrast with averages of 1.6 and 1.1 percent. This variation was particularly evident in large fish where the maximum of 3.7 percent coincided with the period of best condition from August to November. There was also a significant difference between large and medium-sized fish in that the content of fatty acid 22:6 in large fish was 26 percent and in medium-sized fish was 33 percent. Liver oils in female fish contained increasing amounts of fatty acids 20:1 and 22:1, which increased from 4.5 to 14.9 percent and from 1.8 to 12.3 percent, respectively, with increased fat content of the liver. The maxima for these two fatty acids occurred in late summer and fall. This seasonal trend was not as obvious in male fish. No other

*Item on back of card.

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 ABSTRACTER: M. F. Tripple

4.29 (*) PLANT AND ANIMAL FATS AND OILS EMULSIFIED IN A MODEL SYSTEM WITH MUSCLE SALT-SOLUBLE PROTEIN

Christian, J. A., and R. L. Saffle (Food Science Department, University of Georgia, Athens 30601)
Food Technology 21, No. 7, 86-89 (July 1967)

The effect of various chemical and physical properties of fats and oils on the amounts of fat or oil that could be emulsified in a model system by using salt-soluble protein and a synthetic emulsifying agent was determined. Twenty-six samples of fat and oil from various sources were used to determine the amount of each that could be emulsified when salt-soluble protein or the ammonium salt of sulfate ester of analkiphenoloxpoly ethanol was the emulsifier. Iodine numbers, acid values, and specific gravities were determined and were correlated with the amounts of fat or oil that were emulsified.

The correlation coefficients were quite low, which indicated that these factors had little influence on the amounts of fats and oils emulsified. The amounts of pure fatty acids and pure triglycerides that were emulsified depended on their chain length. More of the shorter-chain saturated fatty acids and triglycerides were emulsified than were the longer-chain saturated fatty acids and triglycerides. More fatty acids with one double bond were emulsified than were fatty acids with two double bonds. The results indicated that less of the saturated fatty acids were emulsified than were those with one or two double bonds when the length of the carbon chain remained constant.

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 ABSTRACTER: M. F. Tripple

4.3 BINDING OF OIL IN CANNED SALMON

Bilinski, E., and P. Clement (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 24, No. 6, 1203-1207 (June 1967)

In recent years it has been noted that freezing of salmon before canning results in a canned product of low drained free oil and unchanged total lipid content. Although drained free oil in canned salmon cannot be considered a reliable indicator of total lipid content, free oil continues to be one of the quality characteristics of canned salmon. It has become commercial practice to increase the drained free oil content by adding salmon oil during canning. An investigation of the factors governing the drained free oil content of canned salmon was conducted. The investigation showed that the decrease in drained free oil occurred more rapidly in salmon stored in refrigerated, salt-fortified sea water at 25° F. than in salmon stored in ice; however, by the 10th day of storage, there was no significant difference among fish stored by the two methods. Because it was also established that there was no loss in total lipid, it was obvious that changes resulting in the binding of oil had occurred. This study is concerned with the nature of the binding of oil.

Sockeye salmon were canned after various periods of storage in ice or in refrigerated salt-fortified sea water at 25° F. The fish held in sea water were

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 ABSTRACTER: M. F. Tripple

4.13

acids showed a definite variation with the seasons. No definite relation could be established between ripening and fatty acid composition in the fatty acids of roe and milt lipid. The fatty acids of milt were similar to those of the roe except for a higher percentage of 18:1 and a lower percentage of 16:1 in the milt. The unsaponifiable matter was higher in milt lipids than in roe lipids.

The results indicated that large variations can occur in the fatty acid content of lipids from individual fish and because of this, a single analysis could give a fatty acid composition that is quite different from the average of a large number of determinations. [11 references]

4.13 LIPIDS OF ALASKA POLLACK (THERAGRA CHALCOGRAMMA)

Takama, Kōzō, Kōichi Zama, and Hisano Igarashi
Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 3, 133-138 (November 1966)

This study determined the lipid content and properties of the lipid from flesh of the Alaska pollack (Theragra chalcogramma). Acetone-soluble lipids from the fish were chromatographed on a silicic acid column, and lecithin and cephalin were separated by treatment with ethanol. The lecithin was purified by the diethylaminoethylcellulose column chromatographic technique. The phosphatidylserine and -ethanolamine were separated and isolated by ammonium-silicate column chromatography. The fatty acid composition of each of these lipids was determined by gas-liquid chromatography. Tables are presented that show these detailed analyses of the lipid classes. [Abstracter: M. M. Gwin]

3.2490

Objective and subjective tests on dogfish during the initial stage of discoloration showed that at this point the muscle lipids had not undergone oxidation or hydrolysis. The next changes evident were development of an acidic type flavor and rancidity. The rate of development of oxidative rancidity in muscle stored at -10° C. was compared with the rate of rancidity development in species of salmon and sablefish during storage at -10° C. The comparisons indicated that lipids of frozen dogfish undergo oxidation at a similar or greater rate than do lipids of other species of fish.

The results of protein denaturation and lipid hydrolysis tests indicated a relation between these two biochemical changes during storage of frozen dogfish. After 120 days of storage at -10° C., the free fatty acids formed were 4.6 percent of the total lipid extracted; on a wet muscle basis, this was equivalent to 524 mg. free fatty acid per 100 gram muscle. The soluble protein nitrogen content was 67 and 57 percent after 120 and 135 days of storage, respectively. The average total lipid content of dogfish muscle was 13.7 percent.

The results indicate that dogfish muscle is susceptible to lipid oxidation and hydrolysis, protein denaturation, and color change during frozen storage. Under commercial conditions of handling and storage, the authors assumed that the quality of frozen dogfish carcasses and belly flaps could be maintained during storage at temperatures of from -20° to -25° C. for 3-5 months. It is suggested that kidney tissue in the dorsal region of the peritoneal cavity should be removed during processing to prevent the early development of off-odors. A glaze applied to frozen dogfish carcasses would assist in retarding lipid oxidation and color change during storage. [13 references]

LIPIDS OF ALASKA POLLACK

4.3

partly frozen. Determinations of drained free oil were made on the canned product after the cans had been stored for either a few weeks or for 10 months at about 65° F.

The drained free oil was essentially the same whether the determinations were made 1-4 weeks after canning or 10 months later. The cans prepared from salmon stored in ice for 10 days or in sea water for 3-10 days always showed a low content of drained free oil. The amounts of total lipid extracted from canned salmon were similar whether diethyl ether, chloroform, or a mixture of chloroform and methanol was used for lipid extraction. The volume of oil released by centrifugation of an aqueous suspension of canned salmon was higher than the volume of drained free oil and amounted to about 65-70 percent of the total lipid present. Under the conditions of measurement, no differences related to storage conditions could be detected, which was in contrast to results when drained free oil was determined.

Centrifugation of intact cans resulted in an increase in the volume of the drained free oil in all cans examined. After centrifugation, the drained free oil content of cans having a low oil content when measured without prior centrifugation was equal to that of cans having a high content of drained free oil without centrifugation. The maximum volume of oil that resulted from centrifugation of the intact cans was much less than that which resulted when an aqueous suspension of canned salmon was centrifuged.

The authors concluded that oil binding in canned salmon was physical not chemical, and might be related to protein denaturation, which causes a more fibrous texture and is less favorable to the release of oil from the tissue during canning. [13 references]

4.29

Less castor oil was emulsified than was any other oil sample, which indicated that a high proportion of hydroxy radicals cause a decrease in the amount of oil that was emulsified. There were significant differences in the amounts of various animal fats that could be emulsified. From a practical standpoint, however, the actual amounts of different animal fats emulsified were within a relatively narrow range. [11 references]

4.29 POLYMERIZED FATS IN THE FRYING OF FISH

Ederveen, P.
Conserva 15e, No. 11, 306-309 (1967) (In Dutch)
Abstracts from Current Scientific and Technical Literature 20, No. 9, Abstract No. 2039 (September 1967)

The steam let off during the frying of fish forms a protective layer on the surface of the fat; this layer prevents the formation of polymers by oxidation. Fried fish that contain an appreciable quantity of polymers picked up from polymer-containing cooking oil will not be acceptable to consumers.

POLYMERIZED FATS IN FRIED FISH

4.91 EFFECT OF REFINED MENHADEN OILS ON THE FLAVOR AND FATTY ACID COMPOSITION OF BROILER FLESH

Miller, David, Edward H. Gruger, Jr., Kam C. Leong, and George M. Knobl, Jr. (Bureau of Commercial Fisheries Technological Laboratory, College Park, Maryland 20740)
Journal of Food Science 32, No. 3, 342-345 (May-June 1967)

The object of this study was to feed broilers a menhaden fish oil of various degrees of refinement and absence of odorous substances to determine the effect of the oil on the flavor and fatty acid composition of broiler flesh. The menhaden oil was refined in three successive steps: (1) destearination; (2) molecular distillation of triglycerides; and (3) conversion of triglycerides to ethyl esters. A sample of oil from each preparation was added to a basal diet of glucose and soybean meal and fed to broilers at a 5-percent level to determine the effect of the oil. Corn oil and tallow were used as control feed.

Molecular distillation resulted in odor-free products; however, this refinement did not alter the fatty acid pattern. Each of the three different preparations of menhaden oil in the test diets contributed 12 marine fatty acids that totaled about 40 percent and were not found in the control diets. Two of the marine fatty acids (20:5ω and 22:6ω3) accounted for one-fourth of the fat in the three test diets. None of the ω6 isomers of these two prevalent marine fatty acids or of two other fatty acids (18:4ω3 and 22:5ω3) were found in the test diets that contained menhaden oil preparations.

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6.190 COMPOSITION AND NUTRITIVE VALUE OF MEALS FROM ALEWIFE, SHEEPSHEAD, MARIA, AND TULLIBEE

March, B. E., and J. Biely (Department of Poultry Science, University of British Columbia, Vancouver, British Columbia); and E. G. Bligh and A. W. Lantz (Fisheries Research Board of Canada Freshwater Institute, Winnipeg, Manitoba)
Journal of the Fisheries Research Board of Canada 24, No. 6, 1291-1298 (June 1967)

Experiments were conducted to determine the feasibility of producing nutritionally valuable meals from four fresh-water fish: alewife (Alosa pseudoharengus), sheepshead (Aplodinotus grunniens), maria (Lota lota), and tullibee (Coregonus artedii). The composition and nutritive value of meals manufactured from these fish were determined and related to results obtained from meals of two typical marine fish--herring and whitefish. The preparation and recoveries of meal and oil from the fish, and the fatty acid composition of the oils are reported by Ackman et al. (1967).

Meals produced from the fresh-water fish contained 62 to 68 percent protein. The ash content was higher in the fresh-water fish than in herring meals; however, except in the sheepshead meal, the ash content was no higher than in meals made from anchovy and menhaden. Sodium, potassium, and magnesium were higher in herring meal than in the fresh-water fishmeals. Iron and copper were present in greater amounts in the fresh-water fishmeals. Riboflavin, pantothenic acid, niacin, and vitamin B_{12} were present in lesser amounts in the fresh-water fishmeals than in the herring meal, as was choline. The amino acids showing the greatest

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5.7 VITAMIN E AND STRESS. 1. DIETARY UNSATURATED FATTY ACID STRESS AND THE METABOLISM OF α-TOCOPHEROL IN THE RAT

Green, J., A. T. Diplock, J. Bunyan, D. McHale, and I. R. Muthy (Walton Oaks Experimental Station, Vitamins Ltd., Tadworth, Surrey, England)
British Journal of Nutrition 21, No. 1, 69-101 (1967)

The biological antioxidant theory of vitamin E function was analyzed. When small amounts of [5-Me-^{14}C]α-tocopherol were present in lipid systems that were subjected to autoxidation in vitro, peroxidation did not occur without destruction of the tocopherol. Destruction occurred if tocopherol was the sole antioxidant or was in synergistic combination with a secondary antioxidant; it occurred even when the secondary antioxidant was in excess. When [5-Me-^{14}C,^{3}H]α-tocopherol and ascorbic acid were used as a synergistic antioxidant couple in vitro, the tocopherol recovered from the peroxidizing system always had the same isotopic ratio as did the starting material. This meant that regeneration of tocopherol by the secondary antioxidant did not involve a tocopherol carbon radical formed by loss of hydrogen from the 5-methyl group.

Rats were depleted of vitamin E for periods of up to 7 months and were then given as little as 50 µg. of [^{14}C]D-α-tocopherol, after which they were given large amounts of methyl linoleate or vitamin E-free polyunsaturated fatty acid methyl esters prepared from cod-liver oil. Analyses of various tissues, whole

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6.54 PRESERVATION OF RAW MATERIAL FOR FISH PROTEIN CONCENTRATE WITH ISOPROPYL ALCOHOL

Guttmann, A., N. Dambergs, and P. M. Jangaard (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 4, 895-896 (April 1967)

A procedure for the preparation of fish protein concentrate (FPC) uses isopropyl alcohol as the solvent to extract lipids and other substances that may cause undesirable flavors or odors. Isopropyl alcohol is also used as an effective preservative and inhibitor of lipolytic enzymes in fish livers. The raw materials for FPC production from filleting lines can be treated with isopropyl alcohol and stored for later processing. In this instance, the isopropyl alcohol serves both as a preservative and as the first extractant in the regular procedure.

Isopropyl alcohol was added to fresh, ground filleting scrap, which usually consisted of 45 percent bone and 55 percent skeletal muscle. Quantities of isopropyl alcohol were added and well mixed to make a final concentration by weight of 5, 7½, 10, 12½, 15, and 17½ percent alcohol. A small quantity of antioxidant was added. The mixture was placed in 1-gallon cans lined with polyethylene bags; the bags and cans were sealed airtight and stored at room temperature.

After 1, 2, and 3 months of storage, the cans with different alcohol contents were opened, organoleptically tested, and the bacteria counted. The samples with 5 and 7½ percent isopropyl alcohol spoiled during the first month of storage.

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EFFECT OF MENHADEN OIL ON BROILER FLESH

RELATION OF VITAMIN E AND OXIDATION

COMPOSITION AND NUTRITIVE VALUE OF FRESH-WATER FISHMEALS

PRESERVATION OF RAW MATERIAL FOR FPC

5.7

carcasses, and feces showed that the polyunsaturated fatty acids had no effect on either the metabolism or the recovery of [^{14}C]α-tocopherol in any of the animals. When interaction was allowed to take place in the gut between the administered fatty acid esters and tocopherol, a marked destruction of [^{14}C]α-tocopherol was seen in the tissues of animals given the polyunsaturated esters. The importance of oxidative destruction of tocopherol in the gut before absorption was shown when cod-liver oil and lard were compared. The degrees of resistance of erythrocytes to dialuric acid-induced hemolysis was used as an index of vitamin E depletion. Similar experiments with tocopherol in rats given large amounts of cod-liver oil methyl esters also showed little effect. There was a suggestion that prolonged feeding of partly peroxidized polyunsaturated esters could lead to a slight depression of tissue tocopherol concentrations, but no significant differences were obtained.

The results of experiments in vivo were in strong contrast to experiments in vitro. The authors concluded that lipid peroxidation, if it occurs in the living animal, is irrelevent to the problem of vitamin E function. This conclusion was substantiated by a review of literature on the quantitative aspects of the vitamin E-dietary fat relation. [124 references]

4.91

The fatty acid composition of the muscle lipids from broilers fed the various fats showed major differences. The two major fatty acids found in the flesh of broilers fed the basal diet were 18:1ω9 and 16:1ω7, both of which were found in lesser amounts in flesh of broilers fed control diets containing corn meal, corn oil, and tallow. The decreases were compensated for by an increase in 18:2ω6. Relatively small quantities of 18:4ω3 and 20:4ω3 were found in the flesh of broilers fed the three menhaden preparations. The three marine fatty acids present in appreciable quantities were 20:5ω3, 22:5ω3, and 22:6ω3. The reason for the different total content of these three fatty acids in the muscle lipids of the broilers fed the test diets is inexplicable.

Along with an increase of the 14:0 that was derived from the fish oil preparations, there was a comparable decrease of 16:0, so that the saturated fatty acids totaled between 26 and 32 percent of the lipids. Minor increases occurred in 17:1 + 16:2, 19:0 + 16:4, and 20:1, and 22:3. The content of 18:1ω9 decreased, either from inhibited synthesis or from dilution by the marine fatty acids.

The flesh of broilers fed the basal diet and those fed diets containing corn meal, corn oil, or tallow were given identical scores in organoleptic tests; the flesh of broilers fed the menhaden oil preparations was considered less acceptable. It was concluded that the factor(s) contributing to flavor resides in the marine-type fatty acids whether they are fed as the triglycerides or as the ethyl ester. The rank correlation analysis indicated a positive association at the 5-percent level of significance between the organoleptic scores and deposited quantities of four fatty acids of the ω3 family, 18:4, 20:4, 20:5, and 22:5. [16 references]

6.54

The cans with 10 and 12½ percent alcohol were organoleptically unchanged during the same period of time. The bacterial count was 2,000 per gram after the first month and did not increase thereafter. The cans with 15 and 17½ percent alcohol were organoleptically unchanged after 3 months, and bacteriological examination did not show the presence of bacteria. Proteolytic enzymatic activity was negligible.

The preserved fish was processed by extraction with isopropyl alcohol using a solvent-to-water ratio near the optimum range for fat extraction. For example, 3,000 g. scrap preserved with 13 percent alcohol contained about 1,750 g. skeletal muscle, 1,250 g. bones, and 450 g. isopropyl alcohol. The muscle contained about 1,400 g. water, so 2,150 g. more isopropyl alcohol was added. The mixture was stirred, boiled, and filtered while hot. The cake was washed with 500 g. alcohol, then suspended in twice its weight of alcohol and extracted again. The press cake was air dried and screened into two fractions; both fractions were ground separately and dried to remove traces of alcohol. The extractions of each fraction were done in duplicate. Some of the bones were discarded, which explains the relatively low ash content.

Fish protein concentrate prepared from preserved cod scraps

Properties of products	Fraction I	Fraction II
	Percent	Percent
Yield	11.5, 12	4.5, 5
Moisture	4.0, 4.25	3.6, 4.0
Ash	8.0, 8.5	33, 35
CaO	2.5, 3.0	15, 16
Total nitrogen (F = 6)	14.5, 15.0	9.5, 10
Lipids	0.05, 0.08	0.05, 0.10

6.190

variation among the different meals were lysine, cystine, and glycine; the amino acids showing the least variation were methionine and leucine.

The results of pepsin-digestibility tests showed that the protein in all the meals was more than 95-percent digestible under the test conditions. Availability of the lysine content was determined chemically and was higher in the herring and whitefish meals than in the fresh-water fishmeals. Results of the biological tests indicated only slight differences among the meals. The supplementary protein values of the fresh-water fishmeals were as high as the value of the two marine fishmeals. The efficiency of feed conversion showed all the meals to be of similar nutritive value. A similarity in protein nutritive quality was found between the herring and whitefish meals. The values of 3,005 and 2,425 Calories of metabolizable energy per kilogram for the herring meal and the whitefish meal, respectively, were in agreement with the average values reported in the literature.

The results of broiler diet supplementation showed that there was no difference in response to the different fishmeals. The growth rate and efficiency of feed conversion were slightly higher with the herring meal.

The tests of the protein nutritive quality and of the metabolizable energy content for poultry of meals manufactured from the four fresh-water fish showed that they were comparable in protein and energy value to meals manufactured from marine fish. The possibility of manufacturing meals for poultry and livestock feed would depend upon whether the development of such an industry would constitute an efficient and economic use of this source of protein. [11 references]

6.54 FISH PROTEIN CONCENTRATE SEEN POSSIBLE NEW INDUSTRY

Mitchell, C. L.
Fisheries of Canada 19, No. 11, 12-15 (May 1967)

This article explores some of the implications for Canada's fisheries of the U.S. Food and Drug Administration regulations governing the interstate sale of fish protein concentrate (FPC) as a food additive. An analysis is made of the economic factors governing the production of FPC, methods of production, prospects for Canada's fisheries, and obstacles to the development of an FPC industry.

FPC will be used in small quantities as an additive that will enrich the protein content of a variety of foods. The demand for FPC will depend on the demand for food in general, especially in the underdeveloped countries whose populations have a low-protein intake. Demands for FPC may also be high in wealthier and more highly developed countries where such demands can emanate from food companies that could use FPC in cereals, soup, bread, ice cream, and a variety of foods having a low-cholesterol content.

The supply of FPC will depend on the volume of fish landings, the prices paid for various fish species, and the competing demands for different uses of these fish species. As an example, the FPC industry will compete with the fishmeal industry for the use of large quantities of low-priced fish.

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 ABSTRACTER: M. F. Tripple

7.86 COLIFORM BEHAVIOR IN FROZEN FOODS
I - RAPID TEST FOR THE RECOVERY OF ESCHERICHIA COLI FROM FROZEN FOODS

Fishbein, Morris, Bernard F. Surkiewicz, Elijah F. Brown, Harriet M. Oxley, Adriano P. Padron, and Ralph J. Groomes (Division of Microbiology, Food and Drug Administration, U.S. Department of Health, Education, and Welfare, Washington, D.C.)
Applied Microbiology 15, No. 2, 233-238 (March 1967)

Previous studies have shown the advantages of using E C Medium (Difco) at 45.5° C. as a confirmatory test in the recovery of Escherichia coli from foods. The E C Medium method, when preceded by one in which Lauryl Sulfate Tryptose (LST) medium is used at 35° C. as a presumptive step, has been adopted by the Association of Official Analytical Chemists (AOAC) as official, first action. The present investigation is a comparison of the AOAC method with three other procedures for their ability to recover E. coli from frozen foods.

The 496 samples of frozen foods used in this study represented three categories: seafood products, variety foods, and cream pies. The seafoods were shrimp croquettes, codfish cakes, breaded fish, breaded shrimp, shrimp rolls, stuffed flounder, deviled crab, and fried fish steaks. The three procedures compared with the AOAC method consisted of two presumptive tests, one in which LST medium was incubated at 35° C. for 24 hr. and one in which it was incubated at 44° C.; two

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 ABSTRACTER: E. R. Weissman

7.523 PROTEIN QUALITY OF FEEDING-STUFFS
4. PROGRESS REPORT ON COLLABORATIVE STUDIES ON THE MICROBIOLOGICAL ASSAY OF AVAILABLE AMINO ACIDS

Boyne, A. W., S. A. Price, G. D. Rosen, and J. A. Stott
British Journal of Nutrition 21, No. 1, 181-206 (1967)

A Protein Quality Group was formed in 1955 by the Agricultural Research Council of England to undertake collaborative work on the development of laboratory procedures for the assessment of protein quality in animal feed components. In 1959, the Group formed a Microbiological Panel of specialists to consider and develop microbiological methods that could be used for the selection of animal feeds for protein quality. This progress report on the work of the Panel deals with three preliminary studies (numbers 1-3 in the table on back of card) on measurement of the microbiological availability of lysine and methionine in a variety of meals, and with two detailed studies (numbers 4 and 5) on certain aspects of the assay of available methionine in protein concentrates. Streptococcus zymogenes and Tetrahymena pyriformis W were used as the organisms.

The detailed studies on certain aspects of the assay of available methionine covered the effects of dry or wet grinding of the test meals, the use of crude or purified papain for predigesting the ground meals, and the adoption of optical density or titratable acidity as the bacterial growth response used to estimate the methionine available to S. zymogenes in the meals. The results clearly showed

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 ABSTRACTER: M. F. Tripple

7.871 OXIDATIVE DETERIORATION OF FLESH LIPIDS OF PACIFIC COD (GADUS MACROCEPHALUS)

Roubal, W. T. (Food Science Pioneer Research Laboratory, Bureau of Commercial Fisheries, Seattle, Washington)
Journal of the American Oil Chemists' Society 44, No. 5, 325-327 (May 1967)

The lipids of lean fish flesh exist to a considerable extent as phospholipids associated with muscle tissue. Numerous studies have characterized the structural and metabolic roles of phospholipids and have indicated that the phospholipids play a role in the oxidative deterioration that arises in the processing and storage of food products.

The objects of this study were (1) to provide information on the major lipids of the light flesh of Pacific true cod (Gadus macrocephalus), (2) to measure the rates of oxidation of lipids in model systems, and (3) to determine if the porphyrins of cod show prooxidant properties.

Extractable oils represent 1 percent of the samples, phospholipids represent 65 percent of the total lipid, and the remaining lipids are of the neutral lipid class. Major phospholipids present are phosphatidyl choline and phosphatidyl ethanolamine; lesser phosphatides present are phosphatidic acid, phosphatidyl serine, and sphingomyelin.

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 ABSTRACTER: M. F. Tripple

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that the residual standard deviation increased with the mean available methionine so that for all the analyses the variable analyzed was the logarithm of the estimated available methionine.

Summary of collaborative studies on meals

Study No.	Subject	Meals used	Organism
1	Total and available methionine	Whale, soybean, meat, groundnut	S. zymogenes T. pyriformis W
2	Available lysine and available methionine	Fish	S. zymogenes T. pyriformis W
3	Effect of preparation on available lysine and available methionine	Soybean, whale, meat, groundnut	T. pyriformis W
4	Effect of preparation, predigestion, and growth response criteria on available methionine	Soybean, whale, fish, groundnut	S. zymogenes
5	Effect of preparation and growth response criteria on available methionine	Fish, skim milk powder, soybean, meat, groundnut	S. zymogenes

A provisional method proposed for the assay of available methionine with S. zymogenes calls for dry grinding and predigestion with an agreed level of papain to be used in the preparation of meals. [43 references]

6.54

The production method for FPC to be used in U.S. plants is similar to a method developed by the Fisheries Research Board of Canada. The process involves grinding the fish and treating them with alcohol solvent to remove fats and moisture, separating the solids from the liquids, distilling the solvent that can be used again, and drying and grinding the solid residue into fish protein concentrate. The technical process for FPC is not the same as the process for fishmeal production; however, there is no reason equipment for both fishmeal and FPC production cannot be combined in one plant.

The prospects for establishment of an FPC industry in Canada are good. These prospects are based on the availability of technical knowledge about processing, the availability of adequate supplies of low-priced fish for use as raw materials, and the likelihood that good returns will be attained despite the initial high cost of the plant and relatively high operating costs. An advantage that Canada will have over the United States in production of FPC is that prices paid for fish by processors are generally lower in Canada than in the United States. Canada's fisheries should be able to provide adequate supplies of fish for FPC processing. The Americans estimate that the market price for a ton of FPC will be over $400. Even making allowances for transportation costs and tariffs, Canadian producers should have little difficulty in catering to the U.S. market or in competing with U.S. producers on the world market.

It would appear that Canada has the potential to become an important producer of FPC. In view of certain problems that have to be surmounted, the realization of this potential will depend on the overall demand for FPC and the market prices. It seems likely that this demand will be favorable because FPC can have a worldwide market.

7.871

Paraffins and other hydrocarbons, triglycerides, and vitamin A esters constitute the majority of the neutral lipids. The fatty acid content is limited chiefly to phospholipids, with lesser amounts in the triglyceride, vitamin A ester, and cholesterol ester fractions. The neutral lipid fraction is characterized by a high content of palmitate and a moderate degree of unsaturation. There is a complete lack of C-20 and C-22 fatty acids in the vitamin A esters.

Rechromatographed phosphatidyl ethanolamine oxidizes readily and rapidly in the presence and in the absence of hemoglobin. Only after a long period of time does uncatalyzed phosphatidyl choline begin to show reactivity. The ease with which phosphatidyl ethanolamine undergoes oxidation suggests that this class of lipids is the primary cause of the initial changes leading to rancidity in lean cod flesh. The 20:5, 22:4, and 22:6 fatty acids of cod phosphatidyl ethanolamine show a particular ability. Neutral lipids are almost unreactive under the conditions used. The triglyceride fraction oxidizes quite slowly and vitamin A esters remain inactive.

Aqueous extracts of freeze-dried cod flesh were incorporated into the reaction media to determine the extent to which endogenous porphyrin compounds of cod might enhance oxidation of phosphatidyl ethanolamine. A marked increase in oxidation of phosphatidyl ethanolamine plus buffer extract less cyanamide was attributed to extractable porphyrin compounds. Porphyrin compounds catalyze the cleavage of hydroperoxides and involve free-radical chain reactions; cyanamide inhibits this process. The low content of cod porphyrins could enhance oxidative deterioration in stored cod, particularly in processed foodstuffs that have undergone cellular disorganization and have been exposed to air. [20 references]

7.86

presumptive tests in which E C medium was incubated under the same conditions; and two E C confirmatory tests, both run on E C medium at 45.5° C.

The LST medium incubated at 35° C. produced more E. coli than the E C medium did (337 versus 277), although the productivity of both tests from the gas-positive tubes was about 19 percent. The LST medium at 44° C. yielded 425 E. coli, a greater number of recoveries of E. coli than did any of the other tests, presumptive or confirmatory. The AOAC procedure, which is lengthiest of all, produced 420 E. coli. Thus the LST test at 44° C. is more rapid than any of the other tests. In the measurement of percentage of E. coli from both gas-positive and gas-negative tubes, the LST test at 44° C. gave the highest productivity, 9.52 percent; the AOAC procedure was almost as good, with 9.41 percent productivity.

Since 96 percent of all the E. coli were recovered within 24 hr. by the LST test, it is essentially a 24-hr. test. Thus the LST test at 44° C. used instead of the AOAC test will save much time because it makes a followup 48-hr. confirmatory test unnecessary. The results of this study also confirm earlier findings--that it is possible to describe a specific coliform bacteriological test method by simple reproducible productivity ratios. E. coli recovery dilution data and coliform group behavior were also examined. [13 references]

8.53 FRESHWATER FISH OILS: YIELDS AND COMPOSITION OF OILS FROM REDUCTION OF SHEEPSHEAD, TULLIBEE, MARIA, AND ALEWIFE

Ackman, R. G., and C. A. Eaton (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia); and E. G. Bligh and A. W. Lantz (Fisheries Research Board of Canada Freshwater Laboratory, Winnipeg, Manitoba)
Journal of the Fisheries Research Board of Canada 24, No. 6, 1219-1227 (June 1967)

As part of a program to develop better methods of utilizing Canadian freshwater fish of low economic value, an investigation was conducted to assess the feasibility of producing high-quality fishmeal and oil from fresh-water fish. The four species selected as typical examples of underutilized fresh-water fish were sheepshead, or drum (Aplodinotus grunniens); tullibee, or cisco (Coregonus artedii); maria, also known as ling or burbot (Lota lota); and alewife (Alosa pseudoharengus). This is a report on the composition of the fish, the preparation and recovery of oils and meals, and the fatty acid composition of the oils. A detailed study of significant differences in the fatty acid composition of freshwater and marine oils was published by Ackman (1967).

Data from the examination of oil and of fatty acids were arranged in order of ascending oil iodine value. The oil values were sheepshead, 123; tullibee, 143; maria, 158; and alewife, 165. Evidence was found for three additional C_{18} polyunsaturated fatty acids of unknown structure; the totals of these acids were, respectively, sheepshead, 0.32 percent; tullibee, 0.75 percent; maria, 0.58 percent; and alewife, 0.54 percent.

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 ABSTRACTER: M. F. Tripple

9.125 (*) SEROLOGICAL DIFFERENCES BETWEEN TWO POPULATIONS OF OYSTERS (CRASSOSTREA VIRGINICA) FROM THE ATLANTIC COAST OF CANADA

Li, M. F., Carol Flemming, and James E. Stewart (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 2, 443-446 (February 1967)

An epidemic disease of oysters, known as Malpeque disease, has severely depleted oyster stocks in eastern Canada. One of the features of this disease is that survivors of epidemics and their progeny are disease resistant. In contrast, oysters transplanted from disease-free areas contract the disease and die with a recorded mortality of over 90 percent after 2 years of exposure. Survival apparently depends upon inherent resistance.

Preliminary work on the cross precipitation of oyster sera from disease-susceptible and disease-resistant stocks with the respective rabbit antisera showed that the ring test titer of the homologous antigen-antibody reactions of the resistant stock was higher than the titer of the heterologous reaction with antiserum prepared from the antigen of the susceptible oyster stock. No significant difference was noted between the two reactions with the antigen from the susceptible stock. This report describes further studies on the differences in the antigenic components of two populations of oysters using agar gel diffusion tests.

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 ABSTRACTER: M. F. Tripple

9.13 LIPID METABOLISM IN FISH: ON THE POSSIBLE ROLE OF LONG-CHAIN ALCOHOLS AS PRECURSORS OF PLASMALOGENS

Malins, D.C. (visiting scientist at Torry Research Station, Aberdeen, Scotland; Research Chemist, U. S. Bureau of Commercial Fisheries Food Science Pioneer Research Laboratory, Seattle, Washington)
Biochemical Journal 101, No. 3, 39P-40P (December 1966)

When radioactive-labeled alcohols were incubated with dog heart-lung preparations or were fed to gastropods, significant radioactivity was incorporated into the plasmalogens. The incorporation of labeled alcohols into plasmalogens exceeded that obtained with administered fatty acids. It is conceivable that a precursor for long-chain alcohols, or an activated form, may be possible in plasmalogen biosynthesis. It has been shown with dogfish (Squalus acanthias) that plasmalogens were rapidly labeled after an intrahepatic injection of [1-^{14}C]palmitic acid. The author decided to investigate the possibility that free alcohols and wax esters are also present and, if present, to what extent they become labeled with reference to plasmalogens.

Alcohols were isolated on silica-gel layers along with derivative techniques. Wax esters were separated in light petroleum-benzene-acetic acid. After reaction with boron trifluoride-methanol, the components were resolved in light petroleum-diethyl ether (85:15 v/v).

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 ABSTRACTER: M. F. Tripple

9.13 STUDIES ON THE NORTH SEA COD. IV - EFFECTS OF STARVATION 2. CHANGES IN THE DISTRIBUTION OF MUSCLE PROTEIN FRACTIONS

Love, R. M., and I. Robertson (Torry Research Station, Abbey Road, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 18, No. 5, 417-420 (May 1967)

The muscle of cod (Gadus morhua L.) can be brought into solution by homogenization with chilled 5 percent NaCl solution at pH 7 to 7.5. If the contractile tissue of summer-caught cod is freed from connective tissue and is taken from the anterior end of a fresh fillet on the bone side, it will yield about 0.1 g. of inextractable protein nitrogen and 2.4 g. of extractable protein nitrogen per 100 g. of tissue. Prolonged starvation and the spawning cycle will cause an increase in the water content of muscle from nonfatty fish and a concomitant loss of total protein. A small change in the distribution of protein fractions appears to precede gross change.

The proportions of extractable and inextractable protein change in the autumn. The inextractable protein nitrogen of immature cod caught in November was 0.144 g. per 100 g. of tissue, whereas the average figure for mature fish was 0.450 g. The figures for total protein nitrogen of the immature and mature cod were 2.550 and 2.577 g. per 100 g., respectively, so no emaciation had occurred in November. In January, the values of inextractable protein nitrogen in immature and mature fish had increased further and the total protein nitrogen had fallen slightly. By

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 ABSTRACTER: M. F. Tripple

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The limited data resulting from the studies suggested that an antigenic factor exists between the two populations of oysters. Many factors, such as diet, temperature, salinity, and maturity, may affect the composition of serum protein. As a consequence, care should be taken in interpreting the results of immunological studies. In view of the consistency of the immunological patterns of the two stocks of oysters studied and the variability of disease resistance, the results suggested that these stocks were genetically different. Further immunological studies of the oyster populations by absorption tests and immunoelectrophoretic techniques are in progress to determine precisely the nature of the antigenic components and their relation to disease resistance, if such a relation does exist. [10 references]

9.125 ELECTRO-PERCEPTION IN SHARKS AND RAYS

Kalmijn, A. J. (Laboratory of Comparative Physiology, University of Utrecht, The Netherlands)
Nature 212, No. 5067, 1232-1233 (December 10, 1966)

The author has been investigating the biological significance of electroperception in sharks and rays. To objectively record the responses in a quantitative manner, he studied the reflex reactions of the respiratory apparatus and of the heart. The experiments showed that sharks and rays are extremely sensitive to electric fields and are able to locate the source of the field. [9 references]
[Abstracter: M. F. Tripple]

9.13

March the inextractable nitrogen level had begun to fall in both mature and immature fish; in April all the fish sampled had recovered and the overall average was 0.096 g. The purpose of this research was to study the phenomenon of depletion of extractable and inextractable protein nitrogen in greater detail--to determine whether the depletion appeared solely as a consequence of the spawning cycle, or if it could be induced simply by starvation at a time when the gonads were quiescent.

The phenomenon seen in autumn-caught fish when the gonads are maturing can be induced by starvation alone when the gonads are inactive, so it would appear to be brought solely by lack of food rather than by the action of hormones. The depletion occurs only in well-fed cod that have completely recovered after spawning. It will not occur twice in the same season if starvation periods are interrupted by periods of feeding. What is seen in the phenomenon is presumably the initiation of mobilization of food reserves, because the loss of extractability after 2 to 4 weeks occurs before there has been any measurable loss of protein.

The phenomenon is a potential source of error where changes in protein extractability of processed fish muscle are being studied, because appreciable changes can occur within a short period in the raw material. A study of this kind could be the most sensitive tool available for identifying the initial stages of depletion in cod, since the insoluble nitrogen increases markedly before there has been any noticeable change in water content or optical density, which at the present time are the two main changes studied. [24 references]

8.53

The oils rendered from fresh-water fish did not differ sufficiently in fatty acid composition from those of marine fish to suggest any obvious advantages for edible or nonedible use. It is possible that the relatively high proportions of C_{16} and C_{18} fatty acids would influence plasticity and similar properties of interest to hydrogenators of fish oils. There were few obvious disadvantages to using these fish, other than the two high, free fatty acid values and the high proportion of nonsaponifiable material in the maria oil. The low-fat content of maria might also be accountable for the high, free fatty acid in this oil.

With fish of exceptional low-fat content, it may be practical to return oil with the stickwater concentrate to the meal rather than to recover it as low-quality oil. It is possible that the residual lipids in these meals might offer some advantage when compared with marine fishmeals in that fats of fresh-water fish contain larger amounts of the free acids essential for animal health. [12 references]

Yields of meal and oil, and composition of stickwater

Fish	Yield of		Composition of stickwater	
	Meal	Oil	Oil	Total solids
	(% of raw fish)		(% nonaqueous matter)	
Sheepshead	17.2	3.7	1.54	6.72
Tullibee	17.0	3.9	1.72	7.73
Maria	14.5	0.16	1.24	6.63
Alewife	12.6	5.3	2.35	6.32

9.13

The migration rates of free alcohols coincided with those of a number of other polar lipids. Therefore, a band having a migration rate similar to that of hexadecanol (light petroleum-diethyl ether, 80:20, v/v) was isolated and subjected to hydrogenation. The products were dissolved in acetyl nitrate solution and the derivatives were separated by chromatography with pure light-petroleum as the eluent. Highly pure nitrato-derivatives of free alcohols (R_F 0.8) were isolated and characterized.

The free alcohols varied from 0.05 to 0.07 percent and the wax alcohols varied from 0.02 to 0.05 percent of the total lipids. Maximum specific activities were 380 counts/min./mg. for free alcohols at 6 hr. and 140 counts/min./mg. for wax alcohols at 10.5 hr. The wax acids gradually approached 825 counts/min./mg. in 18.5 hr. Greater specific activities were found during early time intervals for aldehyde chains of phosphatide plasmalogens and various neutral plasmalogen types. The maximum specific activity for phosphatide plasmalogens was 2.3×10^3 counts/min./mg. at 8 - 10 hr. Maximum specific activities for nonesterified α,β-unsaturated ethers and monoacyl α,β-unsaturated ethers, the most active neutral lipid types, were 3×10^4 counts/min./mg. at 6 and 8 hr., respectively.

Small amounts of long-chain alcohols were synthesized and the rate of esterification to wax esters was significant. However, the evidence did not suggest that long-chain alcohols occupy a precursor role in the enzymic processes leading to plasmalogen formation.

0.116 INTERPRETATION OF ZONAL ASYMMETRY IN GEL FILTRATION
(*)

Tracey, M. V., and D. J. Winzor (C.S.I.R.O., North Ryde, New South Wales, Australia)
Archives of Biochemistry and Biophysics 117, No. 1, 184-191 (October 1966)

Zonal asymmetry in gel filtration results from a combination of the effects of solute heterogeneity and concentration dependence of migration rate. A simple, empirical method of analysis is described in which the effects of variations in velocity are eliminated; thus solute purity can be estimated with some degree of confidence. The analysis is made in terms of the apparent diffusion (spreading) coefficients at different concentration levels throughout the zone; heterogeneity is indicated by differences between these values. Constancy of the apparent diffusion coefficients is a necessary condition for homogeneity. The procedure was developed for chromatographic systems, but it may be applied to all forms of zonal transport data.

The results of gel filtration experiments on several commercially available proteins are reported to demonstrate the use of the method. [30 references]

[Abstracter: M. F. Tripple]

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0.116 MOLECULAR-SIEVE CHROMATOGRAPHY

Andrews, P. (Natl. Inst. Res. Dairying, Reading, England)
Chemical Abstracts 64, 2603a (July 18, 1966)

0.5 EFFECT OF AERATION ON GROWTH AND AFLATOXIN PRODUCTION BY ASPERGILLUS FLAVUS IN SUBMERGED CULTURE
(*)

Hayes, A. Wallace, Norman D. Davis, and Urban L. Diener (Department of Botany and Plant Pathology, Auburn University Agricultural Experiment Station, Auburn, Alabama)
Applied Microbiology 14, No. 6, 1019-1021 (November 1966)

Aflatoxins are hepatotoxic metabolites produced by strains of Aspergillus flavus. Structures of the toxic compounds designated as aflatoxins B_1 and G_1 and their dihydrofuran derivatives, aflatoxins B_2 and G_2, have been determined.

Large quantities of aflatoxin must be produced biologically for chemical studies and feeding trials. This paper reports the effect of aeration on growth and aflatoxin production by three strains of A. flavus growing in submerged culture in yeast extract-sucrose medium. A. flavus ATCC 15517 produced up to 212 mg. per liter of total aflatoxin in submerged culture in aerated (3,000, 6,000, 9,000, and 12,000 ml. per minute) and agitated medium in 14-liter fermentors. The fermentors contained 10 liters of medium consisting of 2 percent yeast extract and 10 percent sucrose. The production of aflatoxin increased with time. A maximum of 212 mg. per liter was produced at an aeration of 9,000 ml. per minute, whereas the yield decreased substantially at the lower rates.

The other strains of A. flavus synthesized aflatoxin in smaller quantities. [13 references]

[Abstracter: F. Bruce Sanford]

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0.5 ANTIMICROBIAL ACTIVITY OF AFLATOXINS
(*)

Arai, Tadashi, Tatsuya Ito, and Yasumasa Koyama (Department of Antibiotics, Institute of Food Microbiology, Chiba University, Narashino, Chiba; and Pharmaceutical Faculty, Chiba University, Chiba, Japan)
Journal of Bacteriology 93, No. 1, 59-64 (January 1967)

The antimicrobial activity of a crude aflatoxin preparation and of aflatoxin B_1 was studied. Both aflatoxins were found to be inactive against common gram-positive and gram-negative bacteria at a concentration of 100 micrograms per milliliter. Both samples of aflatoxin, however, did show narrow and limited antimicrobial activity against various strains of Streptomyces and Nocardia. Thin-layer chromatography and bioautogram were used to confirm the antibiotic action of aflatoxin B_1. Nocardia asteroides IFM 8 was found to reduce aflatoxin B_1 among seven strains of microorganisms studied, including aflatoxin-sensitive and -resistant strains, and other minor fluorescent components in the crude preparation. This strain of Nocardia was the only one capable of reducing toxin. [13 references]

[Abstracter: M. M. Gwin]

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0.5 BEHAVIOUR OF MICROORGANISMS AT LOW TEMPERATURES

Schmidt-Lorenz, W. (Federal Res. Center Food Preservation, Karlsruhe, Germany)
Chemical Abstracts 67, No. 9, 41123u (August 28, 1967)

2.117 42-FT. ALUMINUM DRUMMER DESIGNED BY MATSUMOTO

Anonymous
Western Fisheries 73, No. 2, 22 (November 1966)

A high-speed pocket drum seiner is to be built entirely of aluminum and can be powered by any engine over 150 horsepower. The 42-ft. vessel is designed to be capable of planing. The purpose of all-aluminum construction is to cut maintenance and fuel costs. Illustration is on back of card.

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[Abstracter: E. R. Weissman]

The three net reels, each holding 600 fathoms of net, are located on the centerline of the vessel, forward of the deckhouse. These net reels are hydraulically powered; a net roller is positioned on the bow. The vessel is operated by two men.

[Abstracter: E. R. Weissman]

2.117 GILL-NETTER HAS SPLIT WHEEL-HOUSE

Temple, A.
Australian Fisheries Newsletter 26, No. 2, 14 (February 1967)

A 46-ft. steel gill netter is described, which has the unusual feature of a split wheelhouse. The starboard side of the wheelhouse contains the steering wheel, instruments, and engineroom controls. This section also contains access to the engineroom. The port side contains the galley and mess room. The entire section of the deck between the two houses can be removed to allow full access to the engineroom for major overhauls of the engine.

LABORATORY APPARATUS AND EQUIPMENT

BACTERIOLOGY

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FISHING VESSELS

0.3 CLOSTRIDIUM BOTULINUM TYPE F: SEASONAL INHIBITION BY BACILLUS LICHENIFORMIS

Wentz, Myron W., Richard A. Scott, and John W. Vennes (Department of Microbiology, University of North Dakota School of Medicine, Grand Forks)
Science 155, No. 3758, 89-90 (January 6, 1967)

Mud samples from a small stream contained Clostridium botulinum Type F during the summer months. During the period from October to April, no C. botulinum was present in mud samples. Bacillus licheniformis was present from October to May and might be responsible for inhibition of growth and toxin production by C. botulinum Type F during that period of time. [Abstracter: M. M. Gwin]

0.5 A RAPID RADIOASSAY TECHNIQUE FOR CELLULAR SUSPENSIONS

Byfield, John E., and Otto H. Scherbaum (Departments of Physiology and Zoology, University of California, Los Angeles 90024)
Analytical Biochemistry 17, No. 3, 434-443 (December 1966)

A simplified technique is described for studying in vivo the uptake of labeled precursors into the proteins and nucleic acids of microorganisms. Application of this technique to studies of protozoan and bacterial systems are presented. The details of the technique are discussed, as are its drawbacks and advantages.
[Abstracter: M. F. Tripple]

2.117

42-ft. aluminum drum seiner

0.116 APPARATUS FOR HIGH-VOLTAGE THIN-LAYER ELECTROPHORESIS: APPLICATION TO AMINO ACID ANALYSIS

Katz, Sam (Naval Medical Research Institute, National Naval Medical Center, Bethesda, Maryland), and Anne Lewis (Department of Biochemistry, West Virginia University Medical Center, Morgantown)
Analytical Biochemistry 17, No. 2, 300-309 (November 1966)

An apparatus is described for high-voltage thin-layer electrophoresis. This unit is designed to operate at a load of 5.0 kilovolts and 50 milliamperes and is characterized by simplicity of construction and operation. The following factors are analyzed for their relative contribution and interdependence as they affect the operation and resolution ability of this unit: current-voltage relations, electrical field gradients, solvent transport, heat exchange, wick material, salts, buffer types, and concentration. The relative mobilities of the amino acids in a pH 2.5 formic acid buffer and in a pH 10.2 ammonium buffer are sufficiently characteristic to give a basis for tentative identification. The mobility of the amino acids shows a striking functional dependence on the ionic charge, molecular weight, type of heteroatoms in the side chain, and type and concentration of electrolytes used. The resolution ability of this apparatus is equivalent or superior to that obtained with high-voltage paper electrophoresis.
[Abstracter: M. F. Tripple]

0.5 PRODUCTION OF A PYRROLE ANTIBIOTIC BY A MARINE BACTERIUM

Burkholder, Paul R., Robert M. Pfister, and Frederick H. Leitz (Lamont Geological Observatory of Columbia University, New York)
Applied Microbiology 14, No. 4, 649-653 (July 1966)

The properties of a marine bacterium that produces a new antibiotic substance are described. The bacteria is able to synthesize an unusual antibiotic that contains five bromine atoms per molecule. The laboratory methods used in the production and isolation of the compound are also described. The determination and proof of the structure of the antibiotic substance [2,3,4-tribromo-5(1'hydroxy, 2',4'-dibromo phenyl)pyrrole] are described by Lovell (1966).

The identification and taxonomic position of these bacteria were determined with a computer used in conjunction with traditional methods. These microorganisms and closely related strains were isolated on different occasions from tropical water in the vicinity of Puerto Rico. One of the bacteria, a pseudomonad, was given the name Pseudomonas bromoutilis because of its distinctive capability. The antibiotic was extracted, purified, and obtained in the crystal form. The structure was determined. The results of clinical tests of its properties were not encouraging, but it may be of significant value and interest from an ecological standpoint.
[Abstracter: M. F. Tripple]

2.3 (*) NEW FISH SKINNER IS SMALL, RUGGED AND CAN BE SET UP MOST ANYWHERE

Anonymous
National Fisherman 48, No. 3, 14-C (June 1967)

A machine for skinning small fish fillets is described. The unit is intended to be used in small and medium-size fish-processing operations and will handle dogfish and 5-inch halibut. It can accommodate several varieties of fish at a rate of up to 75 fish per minute.

The fillet is fed tail first into the machine. The skin and tail of the fillet passes between two gears, and the bulk of the material forces one gear to try to climb on the other. This action brings down a knife blade, which cuts in from the meat side of the fillet. The cut of the knife may be preset according to the thickness of the skin. The skin is pulled through the gears and the flesh is removed by a combination cutting and shaving operation.

The machine is constructed of stainless steel and heavy aluminum. No areas exist where contaminants can accumulate. The machine is designed to require a minimum of maintenance and it can be cleaned with a steam hose.

The manufacturer claims that the machine is safe because the gears are recessed away from the blade and an object must pass through a small space between the feeding chute and the blade in order to be caught and forced up against the knife.
[Abstracter: E. R. Weissman]

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4.11 (*) SOME LINEAR, ISO, ANTEISO, AND MULTIPLE-BRANCHED FATTY ACIDS OF MARINE ORIGIN: ANALYSES ON PACKED AND OPEN-TUBULAR GAS-LIQUID CHROMATOGRAPHIC COLUMNS WITH PARTICULAR REFERENCE TO PRISTANIC AND PHYTANIC ACIDS

Ackman, R. G., J. C. Sipos, and C. S. Tocher (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 3, 635-650 (March 1967)

The esters of saturated fatty acids isolated from marine lipids or the saturated esters produced by hydrogenation of whole ester mixtures must be analyzed on both polar and nonpolar columns if they are to give adequate qualitative identification and quantitative estimations of minor saturated components. Single-branched fatty acids and multiple-branched acids--such as pristanic (2,6,10,14-tetramethylpentadecanoic), phytanic (3,7,11,15-tetramethylhexadecanoic), and 4,8,12-trimethyltridecanoic--can be determined on packed columns. All the preceding acids and additional minor components are more readily determined on open-tubular (capillary) columns. Polyester (butanediol succinate) open-tubular columns do not show a shift of retention time with relative concentration, whereas this shift may be a severe handicap in reliable use of silicone open-tubular columns. High-efficiency polyester open-tubular columns partially resolve the stereoisomers of pristanic and phytanic acids. [40 references]
[Abstracter: M. F. Tripple]

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4.14 (*) STUDIES ON THE ANTARCTIC WHALE OILS BY GAS-LIQUID CHROMATOGRAPHY USING A HYDROGEN FLAME IONIZATION DETECTOR. VI - 2,6,10,14-TETRAMETHYLPENTADECANOIC ACID IN WHALE OIL

Sano, Yoshihiko (Research Laboratory, Miyoshi Oil and Fat Co., Ltd., Tokyo, Japan)
Journal of the Japan Oil Chemists' Society 16, No. 1, 8-12 (January 1967)

A minor component in the multibranched-chain fatty acids in blubber oil of fin whale was identified by gas-liquid chromatography as 2,6,10,14-tetramethylpentadecanoic acid. The acid was synthesized from phytol, and its identity was confirmed by infrared absorption, high resolution nuclear magnetic resonance, and mass spectrometry. The author estimated that this acid composed about 0.05 percent of the total weight of the fatty acids. The same acid was also found in oils from the blubber of sperm whale and sei whale and in bone of blue whale.
[12 references]

VII - Identification of 4,8,12-trimethyltridecanoic acid as a constituent of whale oil. Ibid. No. 2, 56-61 (February 1967).--A minor component in the multi-branched-chain fatty acids in blubber oil of fin whale was identified as 4,8,12-trimethyltridecanoic acid by gas-liquid chromatography. The acid was synthesized from both farnesol and phytol, and its identity was confirmed by infrared absorption, nuclear magnetic resonance, and mass spectometry. This acid was about 0.005 percent of the total weight of the fatty acids. It was found also in the oils from the blubber of sperm whale and sei whale and in the bone of blue whale.
[26 references] [Abstracter: M. M. Gwin]

*Items on back of card.

8.51 (*) STUDIES ON THE ORGANIC PHOSPHATES IN MUSCLE OF AQUATIC ANIMALS XVIII - ACID-SOLUBLE NUCLEOTIDES IN THE MUSCLE OF ABALONE

Nishita, Kiyoyoshi, Ken-ichi Arai, and Tsuneyuki Saito
Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 3, 139-146 (November 1966)

The acid-soluble nucleotides in the muscle of abalone were separated by anion-exchange chromatography and were identified. The major nucleotides found were adenosine-5'-monophosphate (AMP), adenosine-5'-diphosphate (ADP), and adenosine-5'-triphosphate (ATP). Identified as minor components were cytidine-5'-diphosphate (CDP) or its derivative, uridine-5'-diphosphate (UDP) or its derivative, uridine-5'-triphosphate (UTP), and guanosine-5'-triphosphate (GTP). The approximate amounts of each of the substances were estimated. [12 references]
[Abstracter: M. M. Gwin]

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8.51 STRUCTURE OF PROTAMINE. VII - INFLUENCE OF THE AGE OF THE FISH ON THE COMPOSITION OF ITS PROTAMINES

Waldschmidt-Leitz, Ernst, and Helmut Gutermann (Hellilgenberg Inst., Hellilgenberg/Baden, Germany)
Chemical Abstracts 65, 2689a (July 18, 1966)

4.11 A QUANTITATION PROBLEM IN THE OPEN TUBULAR GAS CHROMATOGRAPHY OF FATTY ACID ESTERS FROM COD LIVER LIPIDS

Ackman, R. G., J. C. Sipos, and P. M. Jangaard (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Lipids 2, No. 3, 251-257 (May 1967)

Methyl esters of fatty acids from marine animals contain large amounts of highly unsaturated long-chain fatty acids. Although esters of saturated and monosaturated fatty acids can be quantitatively analyzed on open tubular columns with a flame ionization detector, there are serious losses of the long-chain highly unsaturated fatty acids of marine oils on the column. Comparison of chain-length composition and iodine value lead to the formation of some correction factors for the highly unsaturated fatty acids. These correction factors permit reasonably accurate analyses. [53 references] [Abstracter: M. M. Gwin]

8.51 SERUM PROTEINS AND ANTIBODY PRODUCTION IN RAINBOW TROUT (SALMO GAIRDNERI)

Post, George (Colorado Cooperative Fishery Unit, Colorado State University, Fort Collins)
Journal of the Fisheries Research Board of Canada 23, No. 12, 1957-1963 (December 1966)

The three major protein components that make up rainbow trout serum can be classified as euglobulins or pseudoglobulins. The euglobulins contain antibodies and are precipitated by 20 percent sodium sulfate. Their electrophoretic mobility corresponds to that of β-globulins and possibly to the least mobile α-globulins of higher animals. [8 references] [Abstracter: E. R. Weissman]

2.3 FISH PROCESSING AT SEA HARVEST FACTORY -- R800,000 PLANT

Anonymous
Food Ind. S. Africa 19, No. 4, 33-35 (1966)
RPC Food Science Abstracts, Abstract No. 66/1412, p. 472 (December 1966)

A new plant in South Africa for filleting, smoking, and freezing fish is described. Illustrations are shown of some of the units in the plant. Waste fish and offal are passed to a separate plant for fish-meal production. Quality control is important because hake comprises most of the catch, and this fish requires careful handling.

4.14 GAS CHROMATOGRAPHY OF SPERM OIL ACIDS AND ALCOHOLS

Vasilescu, V. (Hydrierwerk, Rodleben, Germany)
Chemical Abstracts 63, 13585f (November 8, 1965)

4.14 THE OCCURRENCE OF OPTICALLY ACTIVE 3-METHYLDODECANOIC ACID IN SPERM OIL

Christensen, Per Koch, and Rudolf A. Gehe (Norges Tek. Hoegskole, Trondheim, Norway)
Chemical Abstracts 64, 6917c (February 28, 1966)

1.0119 THE WEST GREENLAND SALMON FISHERY

Saunders, Richard L. (Fisheries Research Board of Canada, St. Andrews Biological Station, New Brunswick)
Trade News 18, 3-6 (February 1966)

This article reports on the contribution of the various salmon-fishing nations to the Greenland salmon-preserving industry; the rate of usage of the fishery and the growth and rate of natural mortality; and the possible effects of the Greenland fishery on salmon returns to North American and European waters.
[Abstracter: M. F. Tripple]

(Abstract of this article appears under 9.7 page 19 - February 1966)

Frechet, Jean
Canadian Fisherman 52, 30-32 (March 1965)

1.0111 WE MAY HAVE TO THINK ALONG DIFFERENT LINES

1.01511 CEYLON

Anonymous
Current Affairs Bulletin, Indo-Pacific Fisheries Council, No. 47, 18-19 (December 1966)

Ceylon has revised its original 10-year (1965-1975) plan for fisheries development, which called for heavy investment in deep-sea fisheries. The revised plan calls for further development of the fishing program for the Continental Shelf and mechanization of existing vessels. The new plan is expected to yield quicker results and bring a greater return on the capital investment for 1967 of more than Rs5 million. It is expected that if this level of investment is maintained for the next 5 years, the total output of Ceylon's fisheries will double to over 200,000 tons. The proposed scale of investment for the original 10-year plan was intended to produce 680,000 tons of fish by 1975.

The Ceylon Fisheries Corporation is in charge of boats, harbors, boat yards, workshops and a gear factory, brackish-water fishery, marketing, communications, navigational and fishing aids, and training and research. The total allocation for the Ceylon Fisheries Corporation is Rs45 million. Of this, Rs21.2 million will go to continue work on four fisheries harbors and to begin work on three other harbors. Purchase of eleven 80-ton boats, tuna boats, and mechanization of existing vessels will take Rs15.5 million. Stores and office equipment will get Rs3.7 million, whereas continuation of work on boat yards and the start of work on a gear factory will take Rs2.3 million. A research vessel and work on a training center will get Rs2 million, and 1.5 million has been allocated for establishing wholesale fish markets.
[Abstracter: E. R. Weissman]

2.1119 BEHAVIOUR OF SWEEP LINE WITH HEAVY BALL

Suzuki, Otohiko (Department of Fisheries, Kyoto University, Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 31, 403-408 (June 1965)

In some types of ground trawling, it is common practice for the sweep line to be connected to the tow rope with a length of heavy chain, the assumptions being that the chain increases the sweeping efficiency of the trawl and prevents the sweep line from leaving the sea bottom. To learn whether or not these assumptions are valid, the author arranged an experimental apparatus consisting of a 3-millimeter nylon twine and a small lead ball (for frictional resistance). Towing the twine at measured speeds and distances, he was able to determine both the towing force and the form of the twine under various conditions.
[Abstracter: L. Baldwin]

2.1119 BEHAVIOUR OF CHAIN FITTED SWEEP LINE IN PAIR-TRAWLING

Suzuki, Otohiko (Department of Fisheries, Kyoto University, Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 31, 409-413 (June 1965)

Using the same experimental gear and arrangement as in the study of the behavior characteristics of a weighted sweep line, the author studied the effect of weight on the sweep line during pair trawling. [Abstracter: L. Baldwin]

2.1126 DIFFERENCE IN SELECTIVITY OF SALMON GILL NET ACCORDING TO THE MATERIALS OF THE NET THREADS

Ueno, Motokazu, Seikichi Mishima, and Shoichi Yamamoto
Bulletin of the Faculty of Fisheries Hokkaido University 16, 143-153 (November 1965)

The selectivity of gill nets is influenced by the following factors: (1) the degree of elongation of net threads when the fish are gilled, (2) the constricting force of the threads by which the fish body is held, and (3) the action of the struggling fish.

During these studies it was found that the selectivity curves (fork length of fish versus frequency of catch) of monofilament and multifilament nets in catching and holding pink salmon (45-65 cm. in fork length) were steep and narrow in the small mesh size nets (230 mm. in perimeter) and gentle and wide in the large mesh size nets (242 mm. and 260 mm. in perimeter). The selectivity curve of pylen net was steep and narrow in both the small and large meshes. A wider range of selection in the large mesh size of mono- and multifilament nets would depend on the high elasticity of the threads as compared with the pylen threads.
[Abstracter: M. F. Tripple]

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2.116 A SIDE-SCAN SONAR PLOTS THE SEA BED

Anonymous
New Scientist 34, No. 549, 648 (June 15, 1967)

Although sonar has long been an aid in plotting the topography of the ocean floor, the conventional vertical type sonar is of little value for spotting objects that are resting on the bottom. Now, however, a Massachusetts-based firm has introduced an apparatus that can scan to port and starboard simultaneously and at high resolution.

This new portable side-looking sonar is called the Mark 1 Dual Channel Side Scan Sonar System. It consists of an acoustic transducer "fish" that weighs 20 lb. and a remote recorder that weighs 75 lb. As the fish is towed through the water, it emits high-frequency sound pulses; the echo is transmitted to the recorder on board the ship. The system's range varies from a few hundred feet to several thousand feet, depending on the type of target being detected and the amount of interference present. Theoretically, the resolution is about 6 in., but in actual practice (because of the spot size of the recorder) it is 1 part in 250 except on the minimum range scale.

In addition to giving a picture of the sea bottom, the apparatus shows both the slant range from the boat's track to various features on the bottom and the distance from the fish to the surface and from the fish to the bottom.
[Abstracter: L. Baldwin]

7.51 DIFFERENTIAL ADSORPTION-SPECTROPHOTOMETRIC ASSAY METHOD FOR NUCLEOTIDES

Adler, Norman, Gerald J. Litt, and Rosemary G. Johl (Merck Chemical Manufacturing Division, Merck and Company, Inc., Rahway, New Jersey)
Analytical Chemistry 39, No. 2, 249-251 (February 1967)

Formate buffer gradients of variable composition and pH for use in the anion exchange chromatographic separation of nucleotides present several problems in the quantitative analysis of the separated nucleotides by ultraviolet absorption. This report describes a solution that is simple and convenient while retaining the advantages of the formate system. [14 references] [Abstracter: M. F. Tripple]

7.51 EXISTENCE AND CHARACTERISTICS OF TRANSFERRIN IN THE DOGFISH SHARK (SCYLLIUM)

Boffa, Georges A., Mario M. Zakin, Andree Drilhon, Yvette Jacquot-Armand, Paul Amouch, and Jean M. Fine (Inst. Oceanog., Paris, France)
Chemical Abstracts 65, 5704g (August 15, 1966)

6.54 'PROTEIN CONCENTRATE' -- SWEDEN SETS THE PACE

Anonymous
World Fishing 16, No. 2, 44 (February 1967)

A factory for the production of fish protein concentrate has recently started operating in Sweden. The plant currently is geared for the production of animal feed, but it is also capable of producing protein concentrate for human consumption. The rated capacity of the plant is 10,000 tons per year and the present output is 1.5 tons per hour.

Fish meal is used as raw material for the production of animal feed. The substitution of a raw material of higher quality and the institution of strict hygienic practices will allow the plant to produce concentrate for human consumption. The Swedish National Institute of Public Health has already approved production of concentrate for human consumption.

The protein concentrate for animal feed is said to be entirely free from fat and is therefore odorless and tasteless. The final product is a gray powder composed of 83 percent full-value protein and 13 percent minerals. At present prices, it is claimed that fish protein only costs about one-thirtieth as much as protein derived from meat. [Abstracter: E. R. Weissman]

9.6 FISH AND FISH INSPECTION

Syme, John D.
Fish and Fish Inspection, 211 pp. (Second Edition [1966]) (H. K. Lewis and Co., Ltd., London, England) Price 42s
Nature 212, No. 5066, 1034 (December 3, 1966)

This revision of a previously issued book covers fish freezing and mechanical means of fish smoking, both at sea and in port, and includes such other aspects of fish handling as salt curing, canning, and the processing of fish meal.
[Abstracter: M. F. Tripple]

9.6 ADVANCES IN MARINE BIOLOGY

Edited by Frederick S. Russell
Advances in Marine Biology 3, 402 pp. (London and New York, Academic Press Inc., [1965] Price 84s)
Nature 212, No. 5063, 673 (November 12, 1966)

This volume covers the effects of heated effluents on marine and estuarine organisms (consequence of the use of cooling water in electricity generating stations); seaweeds of economic importance; and marine toxins and venomous and poisonous marine animals. The review on economically valuable seaweeds includes 26 pages of references. Another review concerns the range of poisonous marine organisms, from dinoflagellates to fishes, and covers all aspects of the subject.
[Abstracter: M. F. Tripple]

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